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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Vol. XXXIX
Number 16

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, OCTOBER 17, 1918

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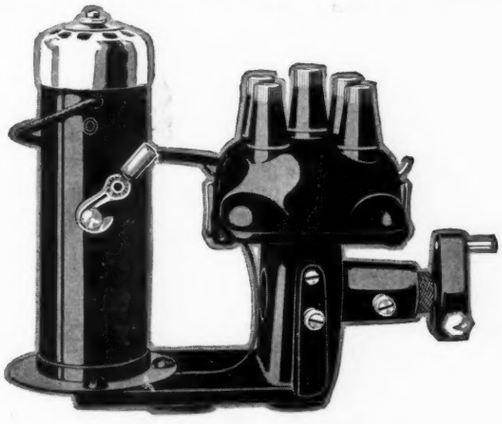

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AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XXXIX NEW YORK, THURSDAY, OCTOBER 17, 1918—CHICAGO No. 16

Tractor Makers Protest Curtailment

30 Manufacturers Form American Tractor Association and Will Lay Their Case Before the War Industries Board—Claim 25% Restriction Order Jeopardizes Their Business and That of Parts Makers as Well

CHICAGO, Oct. 11—The first example of united opposition to a ruling of the War Industries Board because of a curtailment order comes from thirty farm tractor manufacturers who see their business practically wiped out by the 25 per cent reduction ruling of the War Industries Board for 1919. These tractor manufacturers have formed themselves into a new organization known as the American Tractor Association, with the immediate object in view of laying their case before the War Industries Board and presenting to that board an analysis of conditions which these manufacturers think had something to do with the 25 per cent curtailment order.

Some of these thirty tractor manufacturers have been producing tractors in fairly good quantities for the last 2 years, yet nothwithstanding this they see their business seriously threatened through the ruling of the Priorities Division of the War Industries Board. Many of these concerns have already obligated themselves with manufacturers of parts for their 1919 production and see in the recent ruling no apparent recognition that such business arrangements have already been entered into and were entered into before the hearing of the War Industries Board on the curtailment subject.

Few, if any, of these tractor manufacturers were invited to the hearing before the War Industries Board on Sept. 17 when the question of tractor curtailment was discussed. The War Industries Board at that time discussed the subject with the War Service Committee, representing the National Implement and Vehicle Association, and while the meeting was only to have been a preliminary one it resulted in the 25 per cent curtailment. There were many tractor firms not members of this association that have built thousands of tractors and who did not even know that such a meeting was taking place, and who had no voice whatever in the curtailment order. There were scores of smaller tractor concerns that have been in the development process for a year or so and were not notified of the meeting and did not directly or indirectly have a chance to protest or express their views on this subject. The whole matter was handled by the War Service Committee, which, before taking the subject up, did not call a meeting of all tractor manufacturers to discuss the subject. It was a plain case of extinction for practically all of these newcomers, who had not got far into production, without an opportunity of even voicing a protest.

The 25 per cent curtailment order has not only

jeopardized the future of these concerns, but its influence has extended to the manufacturers of parts, such as engines, gearsets, ignition, lubrication and all other parts essential for the tractor. It is, therefore, not surprising that all of these parts makers, or a great many of them, have united with the new American Tractor Association and are ready to take up the case with the War Industries Board. These parts manufacturers have large contracts for future delivery with many of these smaller tractor concerns. The great tractor demand of the present year has resulted in programs for factory enlargements, and to meet these increases in production these parts makers have become part and parcel of these newer firms in the tractor field.

Organization Includes Tractor Pioneers

The list of thirty charter members in the American Tractor Association contains the names of manufacturers of standing, who have been manufacturing tractors for several years. The list also contains the names of parts makers of standing, so that the new organization does not represent a group of mushroom concerns that have sprung up during the past year, but rather firms that have been doing development work for several years and parts makers of long and established standing in the tractor industry. Included are manufacturers of electric apparatus, gearsets, carbureters and radiators who have established businesses, and some of them have been pioneers in the tractor industry.

The formation of the American Tractor Association comes as the result of a settled conviction in the minds of the smaller tractor manufacturers and parts makers that the War Industries Board has been influenced by the membership of the Tractor Division of the Farm Implements Committee of the National Implement and Vehicle Association, which counts in its membership the large and powerful manufacturers of tractors and farm implements and to whose advantage it would be to choke off considerable new development in tractor manufacture. Such has not been publicly stated by the new organization, but this is the sentiment of many comprising it, and it is without doubt the leading spur to organization.

Immediately the ruling of the Priorities Division of the War Industries Board with its 25 per cent restriction on the amount of iron and steel for 1919 was announced by the Farm Implements Committee, the smaller tractor manufacturers and makers of parts sensed disaster to their growing business and at once began to agitate for a modification of the ruling. Believing that they had not been adequately represented at the Washington hearing before the War Industries Board, which resulted in the ruling, and realizing that without organization any protest they might make would be ineffective, the necessary measures to bring about the American Tractor Association were taken.

As a result at the formation meeting held in Chicago Wednesday a representative committee was appointed to go to Washington and present the case of the tractor and parts manufacturers in order to secure a rescinding or modification of the ruling. This committee will demand of the War Industries Board that the weaker interests of the tractor industry be given representation in order that the needs of an essential and growing industry shall receive proper recognition.

It is hinted by many of these newer tractor manufacturers that there is a very large representation of the old-time tractor interests on the War Industries Board and connected with this organization, and that the ruling savors very strongly of being a protection measure to these old-line concerns, which have resented very much in the last 2 years the entrance of new blood into the tractor field and have also strongly resented the entry of the automobile manufacturer, as well as the influence of automobile design on tractor engineering.

The opposition of many of the old-line tractor makers to the Fordson tractor has been very generally construed as not so much an attack against Henry Ford as rather a defensive act of these tractor manufacturers against the invasion of the old tractor circle of makers by the modern automobile and truck industry. It has been rather generously stated by a few of the leading old-time tractor manufacturers that Henry Ford beat them to it in the Fordson tractor, and that if they had thought of it in time they would have done the same thing, but they did not. The opposition to the Fordson started in England as soon as the Government placed tractor contracts. The scene of attack next shifted to Canada and finally to the United States, where it has continued pretty generally ever since. Fortunately there are some of the older interests and also the stronger interests among the old tractor manufacturers who have publicly stated that they will welcome everything that is good in tractor design, no matter whether it comes from the ranks of automobile manufacturers or tractor concerns. They state unequivocally that in these war days the best that comes out must be welcomed and that there must not be opposition to development of design and increase in tractor efficiency.

Thirty Charter Members in Organization

Charter members of the American Tractor Association to the number of thirty signed the following pledge:

We, the undersigned, tractor manufacturers and parts makers, and trade press, do subscribe as charter members to a national organization to be known as the American Tractor Association, with central office in Chicago, Ill., and pledge ourselves to the payment of the first annual dues of $50.

Erd Motor Co.
Square Turn Tractor Co.
Bullock Tractor Co.
Reed Tractor Co.
The Star Tractor Co.
The Evans Mfg. Co.
Zelle Tractor Co.
Powell Tractor Co.
Sumpter Div. Splitdorf Electrical Co.
Climax Engineering Co.
Kohl Tractor Co.
U. S. Tractor & Machinery Co.
Parrett Tractor Co.
Belt-Rail Tractor Co.
Foote Bros. Gear & Machine Co.
Wisconsin Farm Tractor Co.
Kokomo Electric Co.
Perfex Radiator Co.
Brewer Mosel Automobile Co
Nilson Tractor Co.
Wilcox-Bennett Carburetor Co.
Agrimotor.
The John Lauson Mfg. Co.
Illinois Tractor Co.

H. C. Doman Co.	Geo. D. Bailey Co.
Turner Mfg. Co.	Interstate Tractor Co.
Aulson Tractor Co.	Hooven Radiator Co.

Officers, members of executive committee and committee chairmen of the American Tractor Association were elected as follows:

President, B. F. Sprankle, general manager Illinois Tractor Co., Bloomington, Ill.
First Vice-President, W. N. Smith, president Monarch Tractor Co., Watertown, Wis.
Second Vice-President, A. C. Bennett, Wilcox-Bennett Carbureter Co., Minneapolis, Minn.
Treasurer, John B. Foote, president Foote Bros. Gear & Machine Co., Chicago, Ill.
Secretary, Henry Farrington, Agrimotor, Chicago, Ill.

Members of Executive Committee

C. B. Stebbins, president and general manager Climax Engineering Co., Clinton, Iowa.
J. R. Manning, secretary Coleman Tractor Co., Kansas City, Mo.
Edward Kohl, president Kohl Tractor Co., Cleveland, Ohio.
J. C. Westmont, president Wisconsin Farm Tractor Co., Sauk City, Wis.
Leonard Nilson, engineer Nilson Tractor Co., Minneapolis, Minn.
R. F. Florian, treasurer Square Turn Tractor Co., Norfolk, Neb.
Claire L. Barnes, vice-president and general manager Parrett Tractor Co., Chicago, Ill.

Chairmen of Committees

Membership Committee—W. A. Carrell, vice-president Erd Motor Co., Saginaw, Mich.
Constitution and By-laws Committee—L. M. Turner, vice-president and general manager Turner Mfg. Co., Port Washington, Wis.
Investigation and Statistics Committee; Publicity Committee—Henry Farrington, Agrimotor, Chicago, Ill.

The members of the membership committee will remain in Chicago for the remainder of the week making plans for an aggressive campaign. Already assurances have been received from a number of tractor and parts manufacturers who were not represented at the meeting that it is their intention to join. It is hoped to have the membership pass the hundred mark within thirty days.

Another meeting of the association will be called by the executive committee in the near future.

By the 25 per cent curtailment for 1919 many of the old established tractor makers have practically admitted that they will not to any extent be interfered with in 1919 production because the ruling permits them to make use of the inventory which they have had on hand as of Sept. 30, 1918. In addition to this inventory they are permitted to secure 75 per cent of the steel from Oct. 1, 1918, to Sept. 30, 1919, that they had during the previous year. In many cases the inventory on hand amounts to considerably more than the 25 per cent curtailment, so that these concerns do not face any curtailment at all. In some cases it will be possible for them to increase their numerical production.

On the other hand, the small manufacturer who has been in the development stages is apparently denied any such field of manufacture. The ruling is that if he has not built more than ten machines in the year ending Sept. 30 he cannot build more than ten during the year Oct. 1, 1918, to Sept. 30, 1919, no matter whether he has obligated himself for the materials and apparently irrespective of any inventory he may have on hand. The ruling to such a group of manufacturers means practically business extinction.

Going a step farther, the ruling provides that those manufacturers that have not manufactured over fifty machines in the past year cannot increase this output. The unfairness of such a ruling lies in the fact that new concerns that have developed tractors and put fifty out have plans laid for manufacturing several hundred next year and have obligated themselves to the parts makers, and in many cases have inventories on hand. At the same time the parts makers have gone ahead with the purchase of materials, as well as the production of parts for these, and the ruling apparently takes no recognition of what the parts maker has done up to the present and provides no modification for these new tractor concerns and their programs.

The committee appointed to go to Washington to try for a modification of the Priorities Division ruling consists of the following members:

B. F. Sprankle,	John B. Foote,	R. K. Schreiber,
C. B. Stebbins,	C. W. Lamson,	G. E. Manning,
Edward Kohl,	C. L. Barnes,	L. M. Turner.

Following is the registration at the meeting:

W. A. Carrell, vice-president Erd Motor Co., Saginaw, Mich.
W. E. Foster, stockholder Square Turn Tractor Co., Norfolk, Neb.
O. C. Parker, general manager, Bullock Tractor Co., Chicago, Ill.
E. L. Rose, sales manager Reed Tractor Co., Kalamazoo, Mich.
C. W. Pendock, president and general manager Milwaukee Machine Tool Co., Milwaukee, Wis.
P. D. White, vice-president and manager The Star Tractor Co., Findlay, Ohio.
H. P. G. Coats, vice-president and manager American Engine & Tractor Co., Charles City, Iowa.
R. T. Evans, vice-president The Evans Mfg. Co., Hudson, Ohio.
S. W. Harger, Chicago, representing Graham Bros., Evansville, Ind.
W. C. Zelle, president Zelle Tractor Co., St. Louis, Mo.
F. L. Howard, chief engineer Hooven Radiator Co., Chicago, Ill.
S. A. Witt, sales department Detroit Lubricator Co., Chicago, Ill.
John Powell, general manager Powell Tractor Co., Elwood, Ind.
E. P. Gould, sales engineer Sumpter Div. Splitdorf Electrical Co., Chicago, Ill.
C. B. Stebbins, president and general manager Climax Engineering Co., Clinton, Iowa.
Edward Kohl, president Kohl Tractor Co., Cleveland, Ohio.
F. P. Blake, Charles F. W. Nichols Co. Adv. Agency, Chicago, Ill.
B. F. Sprankle, general manager Illinois Tractor Co., Bloomington, Ill.
H. D. Lauson, general manager The John Lauson Mfg. Co., New Holstein, Wis.
E. R. Aulson, president Aulson Tractor Co., Waukegan, Ill.
G. M. Lamson, president U. S. Tractor & Machinery Co., Chicago, Ill.
A. X. Merz, secretary Madison-Kipp Lubricator Co., Madison, Wis.
R. K. Schreiber, president H. C. Doman Co., Oshkosh, Wis.
L. M. Turner, vice-president and general manager Turner Mfg. Co., Port Washington, Wis.
H. P. Albaugh, Chicago, Ill., representing the Square Turn Tractor Co.
W. E. Smith, president Rogers & Smith, Chicago, Ill.

(*Continued on page* 696)

What Langley Did for the Science of Aviation

His Early Experiments in Aerodynamics at Allegheny Observatory — How He Worked Out Fundamentals and Developed Basic Principles Before Attempting to Obtain Free Flight

PART I

IN order to appreciate fully the value and extent of the contributions of Samuel Pierpont Langley to the science of aerodynamics and the application of the principles of that science to practical mechanical flight, one must not only know who Langley was, but what he was, measured as a scientist and as a man.

Of all those who in the early days investigated the possibilities of flight with heavier than air machines, Langley was undoubtedly the best equipped by training, experience and natural aptitude. He was a scientist of world renown whose honors and recognition had been won by the accomplishment of things of which the value could be measured in terms of practicality. He was fitted to succeed in his efforts in aviation, and he did succeed, but the demonstration of his success came when it was too late for him to enjoy the unstained satisfaction in a realization of accomplishment which would have been the greatest reward that he, being the manner of man he was, could possibly have desired. That satisfaction was denied him largely through the attitude taken toward his invaluable work by a dim visioned public press, which was largely responsible for the cutting off of the supply of funds which would have made a continuation of his experiments possible. And the disappointment and humiliation which resulted from cruel criticism and ridicule heaped upon him and those who believed in him and supported and encouraged him in his efforts and the sad result which followed made his life the tragedy it was and him a martyr to a cause which, as we see to-day, was destined to become a vital factor in establishing the freedom of mankind.

Samuel Pierpont Langley was the descendant of a long line of substantial and intelligent citizens of New England, among whom were skilled mechanics, business men, clergymen and teachers, including a president of Harvard University. As Andrew D. White said in a memorial address at the Smithsonian Institution, "They were of those who build or enrich states by conscientious work and sane thought."

Langley was born in Roxbury, Mass., on August 2, 1834, and was educated in the schools of Boston. At 23, having been trained in architecture and civil engineering, he went to St. Louis and Chicago, where he followed his profession for seven years. A natural fondness for astronomy then caused him to give up his profession and devote himself to the making of telescopes, refractors and a reflector. This latter period of about three years was followed by an extended visit to Europe, where he spent most of his time in observatories, scientific institutions and art galleries. Upon his return he was made, first, an assistant in the Harvard Observatory and later professor of mathematics and director of the observatory at Annapolis. At 32 he was made professor of astronomy and physics of the Western University of Pennsylvania and director of the Allegheny Observatory. He remained there for twenty years, and during the latter part of his connection conducted the experiments in aerodynamics which extended over more than three years from 1887, and of which the results are to-day counted among the most valuable contributions to the science.

It was while he was at Western University that, with his ability to

Langley's Achievements

1—His experiments in aerodynamics conducted at Allegheny Observatory from 1887 to 1891 resulted in the compilation of data never before obtained which provided a firm basis upon which to build the science of aviation. Specifically, as summarized by Octave Chanute, they:

(*a*) Established a more reliable coefficient for rectangular pressures than that of Smeaton;
(*b*) Proved that upon inclined planes the air pressures were really normal to the surface;
(*c*) Disproved the Newtonian law, that the normal pressure varied as the square of the angle of incidence on inclined planes;
(*d*) Showed that the empirical formula of Duchemin, proposed in 1836 and ignored for fifty years, was approximately correct;
(*e*) That the position of the center of pressure varied with the angle of inclination and that on planes its movements approximately followed the law formulated by Joessel;
(*f*) That oblong planes, presented with their longest dimension to the line of motion, were more effective for support than when presented with their narrower side;
(*g*) That planes might be superposed without loss of supporting power if spaced apart certain distances which varied with the speed;
(*h*) That thin planes consumed less power for support at high speeds than at low speeds.

2—He made a steam propelled model aerodrome in 1896 which repeatedly demonstrated its ability to make long flights.

3—He built the first gasoline engine suitable for the propulsion of a man-carrying aeroplane.

4—He built the first gasoline propelled model aeroplane to make successfully a sustained free flight.

5—He built the first man-carrying aeroplane capable of sustained free flight, the successful demonstration of which remained for others to accomplish after his death.

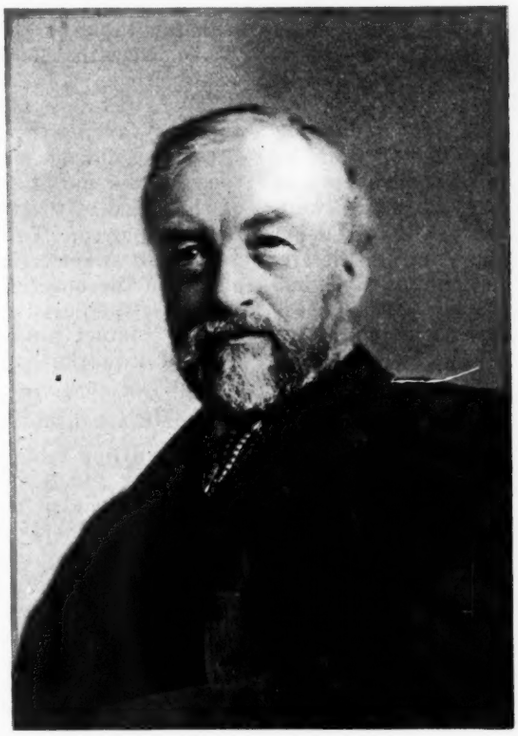
comprehend the practical, he saw the need for a standardized time system for the operation of the railroads of the country, and not only devised the means for providing it but persuaded the railroads to adopt his plan and the method of carrying it out and to furnish the necessary equipment. He linked astronomy and railroad operation and eventually sent the time twice a day from his clock, set by the sun, to stations on railway lines extending for thousands of miles. More than any other man, he is responsible for the system of standardized time in use today.

Langley's investigations of the surface of the sun and his study of sun spots resulted in drawings and records which, though made before the year 1875, are still regarded as the most authoritative data available on the subject. This fact bears eloquent testimony to the infinite care and patience with which he worked and the keen intelligence which guided his efforts.

In 1879 and 1880 Langley developed and constructed the bolometer, an instrument of such infinite delicacy and precision that it indicates accurately variations in temperature of less than one-hundred thousandth of a degree centigrade. By means of it he was able to analyze in detail the heat of the moon in a lunar heat spectrum.

In 1886, following a long succession of astronomical investigations of an original and far reaching character, he was invited to become and became assistant secretary of the Smithsonian Institution with the stipulated privilege of continuing his research work at Allegheny Observatory. In August of the following year he was made secretary of the institution and held the position until his death, on February 27, 1906.

Knowing who and what Dr. Langley was gives one, as we have said, a better conception and keener appreciation of the value of his contributions to the science of aeronautics.



SAMUEL PIERPONT LANGLEY

Langley's experiments in aerodynamics resulted in the compilation of data which provided a firm basis upon which to build the science of aviation

His Methods Logical and Scientific

Unlike nearly all other investigators in the field of mechanical flight, Langley did not follow the cut-and-try methods of the average experimenter. He engaged first in the most painstaking research to determine fundamentals and to discover and classify the principles involved so that he could successfully employ them later. The process which he followed was logical and scientific. It began in the laboratory and ended in the work shop. By the time that he was ready to begin to construct he knew not only what he was going to build, but how he was going to build it, and why it should be built in that particular way. He attacked the problem of developing a new science and of practically applying the principles involved in much the same manner as a naval architect would to-day lay out plans for a merchant ship, and having finished them, send them on to the constructors with the knowledge that if the plans laid out were followed the result expected would be accomplished. There was this difference, however, in Langley's case: He was obliged to work out the fundamentals upon which the plans for construction were based.

A close study of the work which Langley did at the Allegheny Observatory in devising instruments and apparatus for making the tests necessary for the development of the principles he sought results in unceasing wonder at and admiration of the thorough and careful manner in which he carried out his experiments even to the smallest detail. It is impressed upon one, in going over the record of these experiments, that no detail was too small to be regarded by Langley as unimportant. He seems to have given thought to everything that could possibly have been considered. He provided and made allowances for all extraneous factors and influences which could have affected the results and have thus led him from the truth he sought.

The work of Langley in theoretical and applied aerodynamics divides itself naturally into three distinct parts:

1—His experiments in aerodynamics at Allegheny Observatory, where for three years he confined himself exclusively to the making of tests for the determination of principles and the development of data to be used later in constructing models and man-carrying machines.

2—His experiments with rubber-pull and steam-driven models, as a result of which he was able to construct a steam-propelled model which flew for more than three-quarters of a mile.

3—His work with the quarter-size gasoline engine-driven model and the construction, after its successful demonstration, of a full sized man-carrying machine propelled by a gasoline engine.

The fourth part of Langley's work, although it was concluded several years after his death, is the demonstration of the practicability of the machine he unsuccessfully attempted to fly, which was accomplished at the plant of the Curtiss Airplane & Motor Corp. at Hammondsport, N. Y., in the fall of 1914.

This article is the first of a series of four, dealing with the contributions of Dr. Langley to the science of aerodynamics, which will appear in AUTOMOTIVE INDUSTRIES. It deals only with his experiments at the Allegheny Observatory. The three remaining articles will take up the other parts of his work, as outlined above.

Langley was prompted to make his investigations into the possibilities of mechanical flight not so much by the interest which he had felt in the subject for, as he put it, as long as he could remember, as by the conflicting theories which were advanced and the evidently erroneous

explications which were offered even by some supposedly scientific thinkers. There was so much confusion about the whole subject that Langley decided to find for himself by means of laboratory experiments just what the possibilities were.

As was characteristic of him, he gave his entire self over to the undertaking and at the end of something more than three years of the closest kind of work he announced in the introduction to his "Experiments in Aerodynamics," written when the experiments were completed, that his researches had led to the conclusion "that mechanical sustentation of heavy bodies in the air, combined with very great speeds, is not only possible, but within the reach of mechanical means we actually possess, and that while these researches are not meant to demonstrate the art of guiding such heavy bodies in flight, they do show that we now have the power to sustain and propel them." This was written in 1891, many years before the demonstration of the truth of these words was accomplished.

Langley's first three years of work in aerodynamics was, it has been said, down at the Allegheny Observatory, at Allegheny, Pa., to which description of location should be added, if we are to follow the example of thoroughness which Langley set in his own description of what he did there ("lat. 40 deg. 27 min. 41.6 sec.; long. 5h. 20m. 2.93s.; height above sea level, 1145 ft.")

His Apparatus

His principal piece of apparatus was a large whirling table with a radius of 30 ft., which consisted of two symmetrical wooden arms revolving in a plane 8 ft. above the ground. It was driven by a gas engine of 1½ horsepower during the early days of experimenting, but as this was found to be inadequate for the work a steam engine of 10 horsepower was substituted later. A belt from the engine connected with a set of step pulleys providing four different rates of speed. These pulleys in turn drove a horizontal shaft which ran under ground to the axis of the whirling table and drove the latter by means of a pair of bevel gears, having a ratio of 1 to 5. The step pulleys gave 25, 50, 100 and 200 revolutions to the whirling table for 1000 revolutions of the engine.

During the last of his experiments the gear ratio of the bevels was changed to 1 to 4 and a new system of pulleys was installed so that at 120 revolutions of the engine per minute, 48, 24 and 12 revolutions of the whirling table per minute were secured and these corresponded with 100, 50 and 25 miles per hour at the end of the arms.

It was possible, of course, to secure any intermediate speed by varying the speed of the engine.

Langley did not leave the determination of the actual speed at the end of the arm at any time to a calculation of the speed of the engine at that moment and the gear ratio employed. The precise velocity was obtained by means of an electrical registration on a chronograph placed in the observatory. Four equally spaced contact pieces were secured to the fixed axis of the table and a moving contact piece was secured to a horizontal arm screwed into the axis of the turntable and revolving with it.

Advised Erection of Whirling Table Indoors

The whirling table was located in the open air because it was not practical to construct a large building to house it. Langley felt, also, that it was better to conduct his experiments in the open air on calm days, as "in a confined building the rotating arm itself puts all the air in the room into slow movement, besides creating eddies which do not promptly dissipate." It turned out, however, that calm days were not so numerous as had been expected, and in his record of what transpired Langley complained that "from the beginning to the end of the experiments the presence of wind currents continued to be a source of delay beyond all anticipation as well as of frequent failure," and he advised any one making similar experiments to erect his whirling table in a large building.

For use in connection with the whirling table Langley devised and constructed a large number of special instruments, each designed to establish some particular fundamental. Many of these instruments will be described and illustrated later. The care with which the details of this apparatus were worked out is little short of amazing. The results of his long investigations are summarized at the early part of this article and constitute, as is now generally acknowledged, probably the most substantial contributions to the science that any one man has made. *(To be continued)*

Airplane Altitude Record Now 28,900 Ft.

CLIMBING over 5 miles into the air, to an altitude of 28,900 ft., and coming down to a site 200 miles distant from the starting point, were some of the extraordinary experiences of Capt. R. W. Schroeder, Air Service, U. S. A., on Sept. 18. Capt. Schroeder's altitude record has been officially confirmed. He started his flight at Dayton and landed at Canton, Ohio. In the report of the climb, filed with Major General Kenly, Director of Military Aeronautics, he said:

"In order to take an airplane to a higher altitude than any other pilot in the world, I found that it would require more than one or two attempts. I made three attempts. The first one took me to 24,000 ft., the second to 27,000 ft. and the last one to 28,900 ft., but now I feel certain that I can get to 30,000 ft.

"The cold thin air is one's greatest adversary. First of all, one must make a study of the performance of his motor at these high altitudes. I took off at 1.45 p. m. Wednesday, Sept. 18, and made a steady circular climb, passing through clouds at 8000 ft., 12,000 ft. and 16,000 ft.

"At 20,000 ft., while still climbing in large circles, my goggles became frosted, making it very difficult for me to watch my instruments. When I reached 25,000 ft. I noticed the sun growing very dim, I could hardly hear my motor run, and I felt very hungry.

"The trend of my thought was that it must be getting late. that evening must be coming on, but I was still climbing so thought I might as well stick to it a little longer, for I knew I could reach my ceiling pretty soon, then I should go down, and even though it were dark, I could land all right for I had made night landings many times before; and so I went on talking to myself, and this I felt was a good sign to begin taking oxygen, and I did. I was then over 25,000 ft., and as soon as I started to inhale the oxygen the sun grew bright again, my motor began to exhaust so loud that it seemed something must be wrong with it; I was no longer hungry, and the day seemed to be a most beautiful one. I felt like singing with sheer joy as I gazed about through the small portion of my goggles which had no frost, due to a drop of oil which had splashed on them from the motor.

"When I was about 27,000 ft. I had to remove my goggles as I was unable to keep a steady climb. My hands by this time were numb and worried me considerably. The cold, raw air made my eyes water, and I was compelled to fly with my head well down inside the cockpit.

"I kept at it until my oxygen gave out, and at that point I noticed my aneroid indicated very nearly 29,000 ft. The thermometer showed 32 degrees below zero, Centigrade, and the revolutions per minute had dropped from 1600 to 1560."

Tractor Development in Iowa

Agricultural State Has Many Concerns—States in Grain Belt Offer Inducements for Tractor Manufacture

By P. M. Heldt*

MINNEAPOLIS, Oct. 14.—It is quite evident that the center of gravity of the tractor industry will be located farther West than that of the automobile industry. Consideration of shipping conditions naturally draws an industry having a market all over the United States to the center of the country, but the fact that the early demand for automobiles was mostly from the big cities tended to draw the automobile industry eastward.

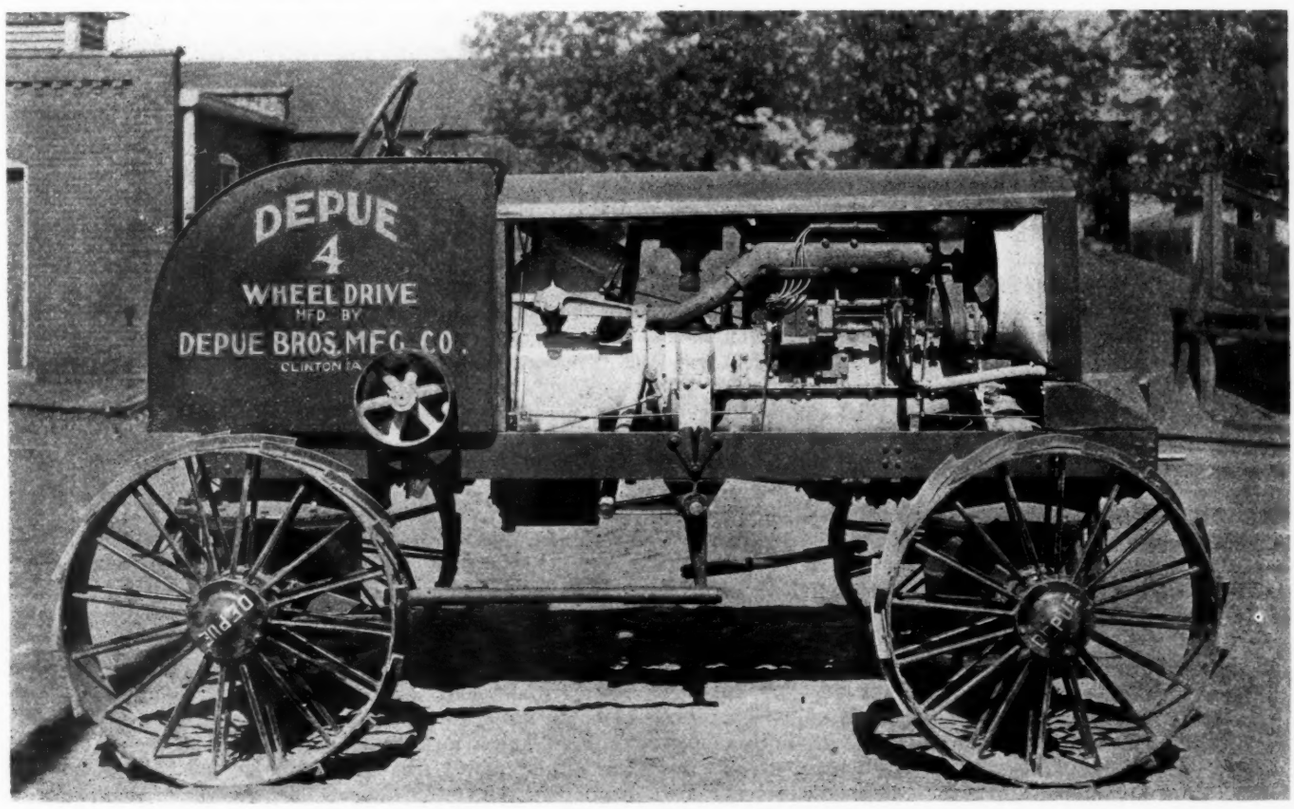
On the contrary, the early demand for farm tractors came from the large farms of the Far West. While Michigan, Ohio and Indiana are the predominating states in the automobile industry, Illinois, Iowa and Minnesota are making a strong bid for the tractor industry. In fact, much of the early work in tractor development was carried on in Iowa and Minnesota, and to-day Minneapolis possesses more individual tractor factories than any other city, though the plants of largest production are located elsewhere.

Iowa at present possesses one tractor factory having a very large output, a number of others of moderate output and some concerns still in the development stage or just getting into production. There are also at least two important parts plants in the state.

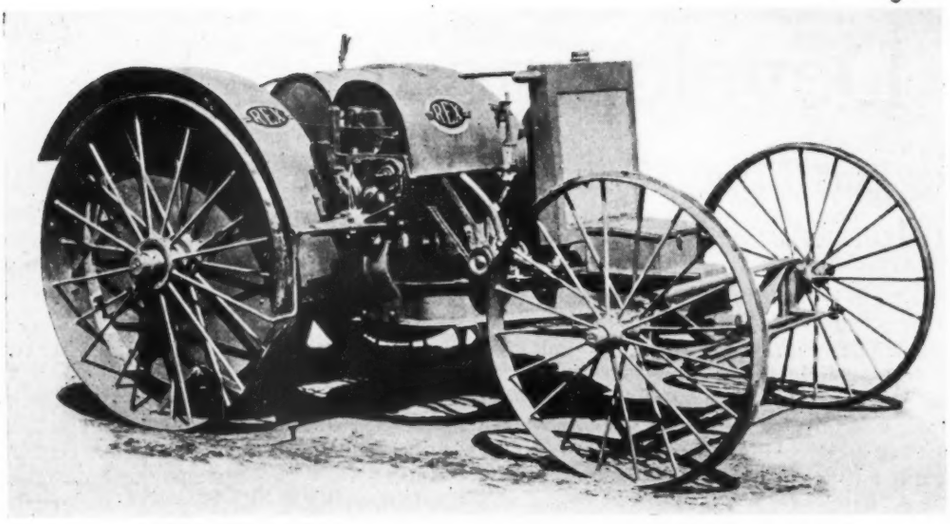
At Clinton, on the Mississippi, is located the Climax company, which manufactures engines for farm tractors. Climax succeeded a well-known marine engine concern (Lamb Boat & Engine Co.) and the men who designed and produced the Climax have had 16 years' experience with heavy duty internal combustion engines. Climax engines are used in Square Turn, Wisconsin, Coleman and Illinois tractors among others. This engine, which burns kerosene, is rapidly gaining favor among tractor manufacturers and the company quite recently has had to build a 90 x 280 ft. factory addition, which is now in use. A new power plant containing a 250-hp. boiler, and an engine and a generator to correspond, are in course of erection. About 100 men are employed. C. B. Stebbins is president and general manager of the company, R. D. Upton, vice-president and superintendent, and J. W. Delany, Jr., secretary and treasurer.

Depue Brothers, who have built a four-wheel drive farm tractor at Clinton, are still in the development stage. The engine and its accessories and the clutch are standard parts, but the frames, axles, steering gear

*P. M. Heldt has been making an extensive investigation of farm tractor manufacturing conditions throughout the Middle West.



Depue four-wheel drive and steer tractor



Rex three-plow tractor built by the Leader Tractor Mfg. Co., Des Moines, Iowa

and final drive are of original design. A Buda Model YU engine is used, together with Stromberg carbureter, Bosch magneto, Perfex radiator, and Borg & Beck clutch.

The transmission, which is of the selective sliding type and gives three forward speeds, is bolted to the engine bell housing to form a unit power plant, and the steering gear housing is bolted to the top of the gearbox. There is no direct drive in the transmission, as at all times the drive is from the primary to the secondary shaft. The latter connects through propeller shafts to the front and rear axles, there being two Spicer joints in the forward propeller shaft and one universal of the company's own design in the rear shaft.

The feature of the tractor is the combined driving and steering axle. Both axles are alike, as the tractor is both four wheel driving and four wheel steering. The axle has a cast steel housing of the double banjo type, the differential casing being open at top and bottom. Into the top is set the gear carrier and this takes the weight of the tractor on a 7-in. Timken bearing. Axle and gear carrier can swing around a vertical axis, this motion being allowed for by a kind of fifth wheel arrangement. In the tractor built, the bearing surface of the fifth wheel is rather hard, and to eliminate the friction a row of balls will be inserted between the gear carrier flange and the stationary ring opposite it.

There is a double bevel gear reduction in each axle, the pinion on the propeller shaft meshing with a gear on a vertical axis, and a pinion at the lower end of the shaft carrying this gear meshing with the bevel gear ring on the differential. Each bevel gear set gives a reduction of 4:1, making the total reduction in the axle 16:1. A further reduction is obtained in the gearset and with an engine speed of 700 r.p.m. The tractor speeds are of 1¾, 3 and 6 m.p.h. The wheelbase is 99 in. and the wheels are 40 x 10 in.

As both axles have to be turned around their vertical center in steering, a very powerful steering gear is required. It comprises a 20-in. hand wheel and a single head worm meshing with a 33-tooth worm wheel. From the arm on the worm wheel shaft a heavy link extends down to an arm on a cross steering shaft under the main frame, and from this there are lever and link connections to the axle housings.

The 8-in. diameter 10-in. face belt pulley is controlled by the drive clutch and by a lever putting the driving bevel gears in and out of mesh. Completely filled, the tractor weighs 7200 lb. It is rated as a four-plow tractor, this rating referring probably to the lowest speed. The belt speed is 3000 ft. p. m.

Depue occupies the plant of the old Clinton Brewing Co. The company was incorporated about a year ago, and its first machine was built in Kenosha, Wis.

The National Tractor Mfg. Co., Cedar Rapids, is the successor to the Denning Tractor Co. The latter concern was organized in 1910, and during its existence turned out several hundred tractors. Recently the production has been brought up to five a day, though the total production for the current year will be only between 200 and 300.

Two models are made, a 9-16 and a 12-22. The National is a friction drive type and employs the Waukesha engine. The flywheel is developed in the form of a friction wheel, and there is a large diameter plate on either side of it which can be forced into frictional contact with it by means of a lever to give forward or reverse drive. From the friction disc shaft is spur gear drive to the differential shaft, this set of gears being located outside the frame and enclosed in a sheet metal housing. From the differential shaft the drive is through double spur gears, fully enclosed and running in oil, to driving sleeves on the rear axle to which the driving wheels are rigidly connected.

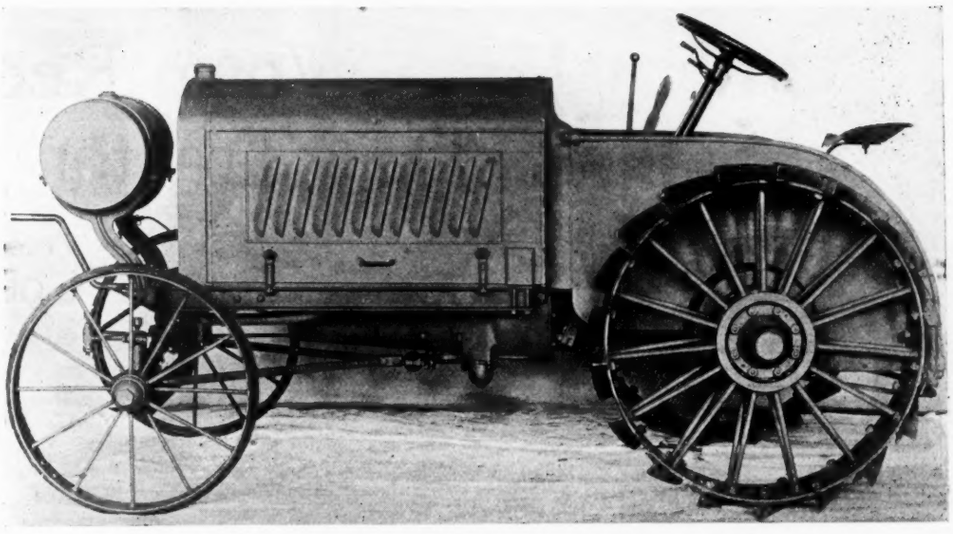
The largest manufacturer of gas tractors in the state of Iowa is the Waterloo, which was originally organized to build such machines as far back as 1893. The gas tractor was not a success at that early period, but the company got into the manufacture of stationary engines for farm use. At present it builds six different sizes of farm engines, of 1¾, 2¾, 4½, 6, 8 and 12 hp. Only one size of gas tractor is manufactured, the Waterloo Boy, a kerosene-burning, two-cylinder, 3-plow design.

The company occupies very extensive works, two of the buildings being 1000 feet long each, and the entire plant covering 40 acres. Approximately 25 per cent of the total capacity is devoted to the manufacture of tractors, and the present output is 35 a day. While an effort was made to manufacture gas tractors in 1893, regular production of these tractors was begun about five years ago, and this branch of the business has seen very rapid development, as may be judged from the present output. About 1400 men are employed.

The engine, a two-cylinder horizontal one with opposed cranks, has a bore of 6½ in. and a stroke of 7 in., and a horsepower rating of 750 r.p.m. of 25 on the brake and 12 on the drawbar. One of the features of the engine is that the forward half of the crankcase can be removed, and the operator can then adjust either the connecting rod or main bearings while standing in a natural position, in which he can apply his strength to the best advantage, and also judge most accurately the character of the adjustment. All valves are located in the cylinder head, which is removable. The engine is set crosswise of the frame and an enclosed transmission is located adjacent to it. The contracting type of clutch is built

together with the flywheel and the belt pulley is located on the end of the primary shaft of the gearset, directly in line with the crankshaft. Two forward and one reverse speeds are obtained by sliding pinions. Transmission is from the primary shaft to a countershaft and thence to the differential jackshaft. At the end of this shaft are bull pinions which mesh with the internal type bull gears on the driving wheels.

The radiator is set with its face parallel with the longitudinal axis of the tractor, which makes for easy drive of the radiator fan, and also protects the radiator against trash being drawn into it. No air cleaner is fitted, but air is drawn into the cylinders through a stand pipe extending 2 ft. above the engine. The fuel tank is carried on brackets at the front end of the frame.

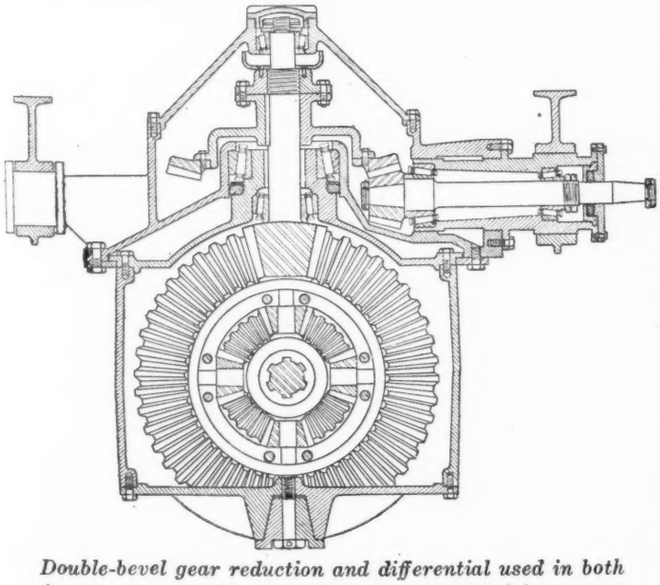


Worm-drive tractor made by the Galloway company of Waterloo, Iowa. It is equipped with a 4½ x 5½ four-cylinder engine

Steering is by a pivoted front axle and a chain extending from lugs near the ends of the axle and running over a drum operated by the steering gear. This construction will be recognized as similar to that usually employed on steam traction engines.

The Interstate, another Waterloo concern, turns out about 1500 tractors a year. The product consists of two models, one 13-30 and the other 15-30 hp. Two different sized engines are used, and though the belt horsepower of both is rated the same, it is stated that the 15-30 model has much more reserve power. Both use Buda engines, Foote transmissions and Cotta clutches. The company formerly made a small tractor known as the Plowboy. This has now been discontinued and eventually the 13-30 model will be known as the Plowboy, while the 15-30 model is referred to as the Plowman.

This concern has also been working on a new model, the Trojan, which has been demonstrated on various occasions, but which is not yet in production.



Double-bevel gear reduction and differential used in both front and rear axles of the Depue four-wheel drive tractor

The 15-30 Plowman, with a 4½ by 6 in. Buda engine, weighs 4800 pounds, of which 2950 pounds is carried on the rear wheels and 1850 pounds on the front wheels. Its engine and gearset are combined into a unit power plant, from which final drive to the rear wheels is by spur pinions and internally toothed bull gears. The driving wheels are provided with cone lugs. Steering is on the Ackerman principle and the front axle is built up and has the front end of the frame pivoted to it. A Bennett air cleaner and a Bennett carbureter are fitted and kerosene is the fuel used.

Another large concern in the agricultural implement industry in Waterloo, which has been doing some work in the tractor line, is the William Galloway organization, which has been making a chain-driven tractor, and is still furnishing some of these machines; but during the past year it has developed a worm-driven job which will be its principal model in the future. The chain-driven model was first taken up 4 years ago, and possibly 800 of this type have been sold and delivered. First experiments with the worm drive are said to date 3 years back, and in January of this year the company received an order for 1080 tractors of this type from the well-known British firm of Henry Garner, Ltd. W. L. Bodman, whose name will be remembered by many whose experience in the automobile field dates back to the early years as one of the pioneers of the British steam truck industry, came to this country during the summer of 1916, having been sent by the Garner concern to look over the tractor field here and select a number of different types of light tractors which would meet the requirements of British farmers. Mr. Bodman purchased and forwarded to England samples of six different tractor types, both creeper and wheel. All these types were thoroughly tested out during the winter and spring of 1916-17. As a result of these tests orders for 1200 tractors were placed with different American makers during 1917, but owing to various causes only ten of these 1200 were delivered during the first 6 months of 1917. Mr. Bodman then returned to America, and by looking personally after deliveries succeeded in getting 250 across during the last 6 months. During this second trip to America Mr. Bodman got into communication with the Galloway company and as a result of a report which he made on its worm-driven model an order for 1080 machines was placed by Garner. Unfortunately, however, Galloway so

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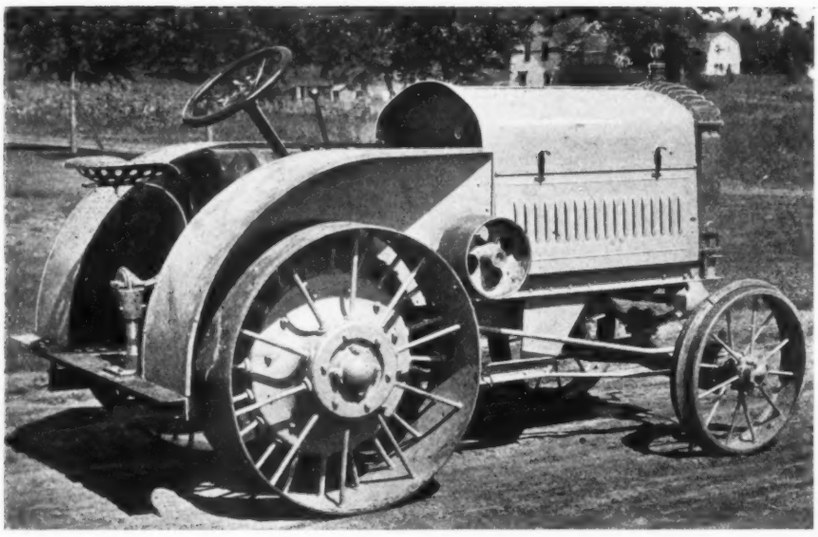
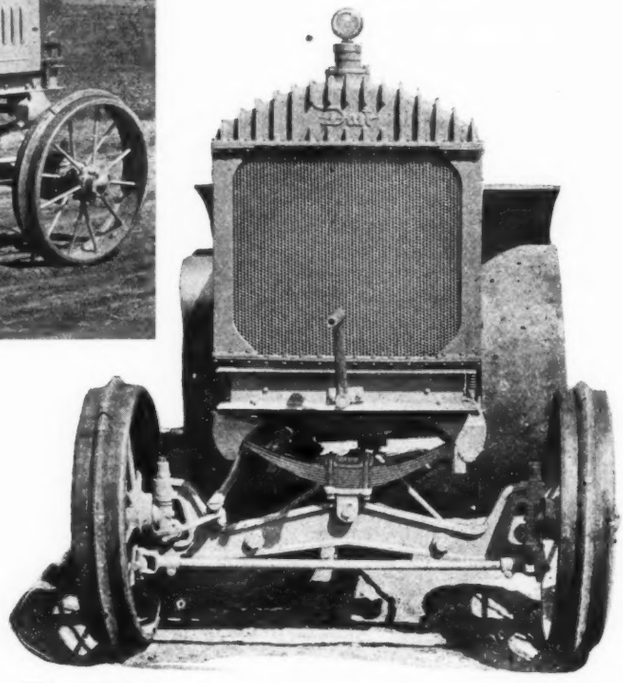
Internal and Worm Reduction in Dart Tractor



Total Reduction of 48⅓ : 1 Is Obtained—Rear Wheels 40-In. Diameter—Weight, 4500 Lb.



Side and front views of the Dart three-plow farm tractor

By P. M. Heldt

A NEW final drive is the distinguishing feature of the Dart farm tractor. It combines the worm with the internal gear drive and takes account of the fact that a worm drive is most efficient at high speeds, while the internal gear drive is most efficient at low speeds.

The new machine is a three-plow tractor and is equipped with a Buda four cylinder 4¼ x 5½ engine. Either a Zenith or Kingston carbureter is fitted, and gasoline is recommended. For regular production Dart will use the new Buda special design of tractor engine, which was not yet available when the model on which this description is based was built.

Fuel is carried in a 20-gal, tank arranged lengthwise behind the engine. A Bennett air cleaner is regular equipment. Ignition is by a Dixie magneto with hand control of the spark. The cooling water is circulated through a Modine radiator with cast top and bottom tanks and distance pieces. The fan is 20 in. in diameter and is driven by a 2-in. flat belt. Engine support is of the three-point type.

The engine, with a piston displacement of 312 cu. in., gives the tractor rating of 15 hp. on the drawbar and 30 hp. on the belt, although it is claimed that the horsepowers developed considerably exceed these figures.

A multiple-disk type of clutch is used which consists of hardened steel plates running in oil. The gearset, giving three forward speeds and reverse, is similar in design to an automobile type except that the intermediate speed is the direct drive, the high speed being geared up. The three forward speeds are 1¾, 2½ and 5 m.p.h. Of these the intermediate speed, 2½ m.p.h., is the plowing speed and corresponds to direct drive.

Power for the belt shaft is obtained from the clutch-shaft through a pair of helical gears located between the clutch and gearbox. The driving member of this gearset is made of hardened steel and the driven one of aluminum bronze. A slight reduction of speed is obtained through this pair of gears, the pulley shaft running at five-sixths the speed of the crankshaft. The belt pulley is 12 in. in diameter by 7-in. face and is of the conventional cast-iron type. A positive clutch is incorporated in the pulley drive so that the pulley need not be kept running while the tractor is used for plowing and other field work. This clutch is of the internal and external gear type. The lever for engaging the pulley clutch has a sideward motion.

Rear Axle Construction

Back of the gearbox a fabric-type universal joint (Thermoid) is incorporated in the propeller shaft. The rear axle construction is similar in lay-out to that of the usual internal gear truck axle, except that the bevel gear reduction at the center of the axle is replaced by a worm gear. The rear axle housing is of cast iron. The worm gear used is the standard 2-ton truck design and gives a reduction of 9 2/3:1. It operates a jackshaft on each end of which there is a spur pinion meshing with an internal gear secured to the driving wheel of the tractor. This internal gear or bull gear is completely enclosed. An additional reduction of 5:1 is obtained by this in-

ternal gearset, making the total reduction for the direct drive 48 1/3:1. The worm and worm gear are supported by a gear carrier and the whole gearset can be removed integrally from the axle housing. This set of gears is mounted on Gurney bearings, and the same make of ball bearing is used in the gearbox and in the rear wheels. The differential is a Brown-Lipe four pinion type.

The rear axle housing is an iron casting made with flanges at the ends to which are bolted two circular disks forming the covering for the internal gears. These disks are formed with lateral flanges at their circumference and the flanges are turned with a groove on the inside in which is inserted a felt packing insuring a dust-tight joint with the gear ring. The spur pinions are made of 3½ per cent nickel steel, hardened, and have a face width of 2¼ in. Steel axle spindles are pressed into the ends of the axle casting for a distance of 8 to 9 in. and are secured in place by set screws. The front axle is of I-beam section and is also an iron casting. The front wheels are fitted with Timken bearings.

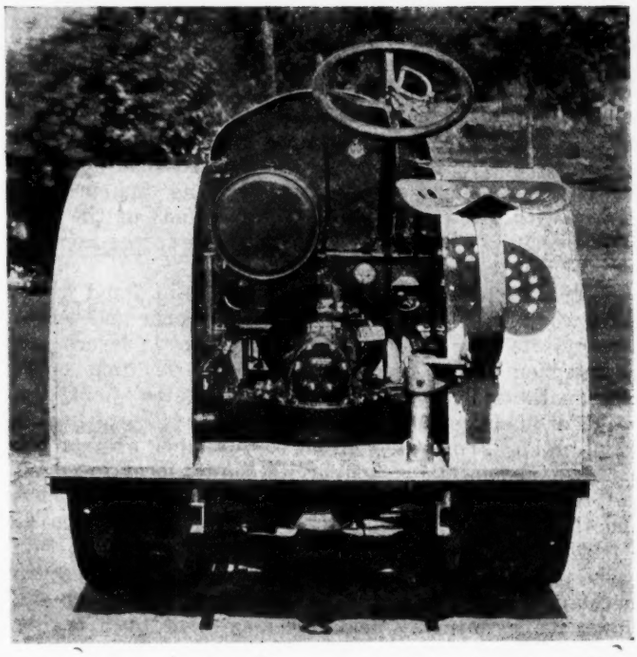
Frame Made of 4-In. Channel Steel

The frame is constructed of 4-in. channel steel, the channels having a weight of 6¼ lb. per foot. The frame extends some distance forward of the engine and has a cross-member of the same material as the side bars at the extreme front. The forward end of the frame is supported on the front axle through a semi-elliptic spring 24 in. long by 2 in. wide, which is swiveled to the axle at the middle and connects through shackles and enclosed type of spring brackets to the frame at its ends.

In addition to the main frame there is a sub-frame made up of 3-in. 4-lb. channels which are placed with the open side outward. These latter channels extend from the rear end of the tractor to about midway between the front and rear wheels, some 16 in. below the main frame channels, to which their front end is connected by brackets of ⅜-in. rolled steel.

At the bottom of the gearbox there is a lug from which extend two slanting radius rods to near the ends of the front axle and two other radius rods to a bracket secured to the front of the rear axle housing. The forward radius rods at their rear end are hinged to an eye bolt passing through the lug of the transmission housing referred to.

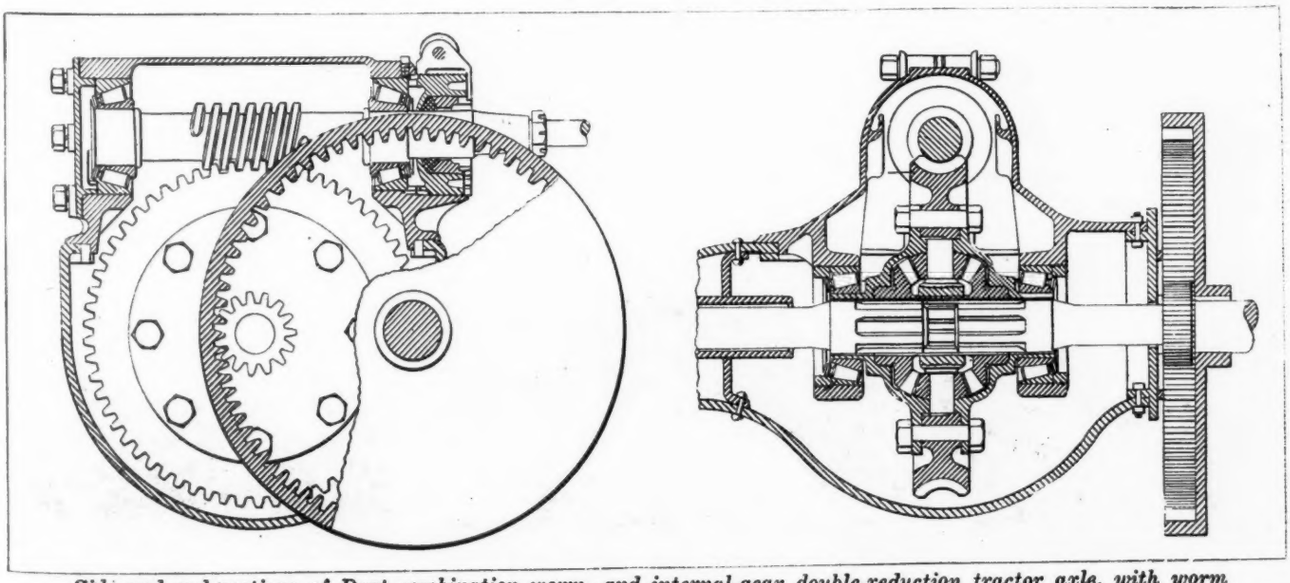
A flexible exhaust pipe leads to the muffler mounted crosswise of the frame close behind the engine. A muffler



Rear view, showing arrangement and construction of the Dart tractor axle

cut-out is provided, this being one of the few tractors so fitted. Mr. Johnson, the designer, argues that a farmer appreciates noiseless operation in his tractor as well as in his automobile and has carried out this idea throughout the design, as both the worm drive and the flexible universal joint make for noiselessness.

Most of the weight on the forward wheels is carried on roller bearings mounted at the inward end of the hubs, whereas a bronze bushing is forced into the outer end. The steering knuckles are of conventional design, and hardened bushings and washers are fitted to them. The front wheels, 28 in. in diameter by 5¼ in. wide, are of the built up type, having cast hubs, round spokes and rolled steel rims. A cast-iron, slightly hooded dash is bolted to the frame and is formed with a ledge on its forward side upon which the rear end of the engine hood rests, there being a corresponding ledge on the



Side and end sections of Dart combination worm- and internal-gear double-reduction tractor axle, with worm reduction at center and internal-gear reduction at the ends

radiator for the forward end of the hood. The hood is hinged at the center. Its sides, which hook under sheet metal angles riveted to the frame and are secured in place by means of spring type hood fasteners, can be readily removed to give access to the engine and its accessories. The fenders and dust guards are made of No. 16 gage sheet steel, reinforced and fastened together with angle steel. The forward ends of the fenders are cut off at an angle, which adds to the appearance of the tractor.

Steering is effected by means of an 18-in. hand wheel with wood rim, operating through a worm and wheel Lavigne steering gear. Spark and throttle levers are mounted on top of the steering wheel. A brake operates on the rim of the fabric type universal joint, the brake drum being 9¼ in. in diameter by 2¼ in. wide. This brake is operated in a very simple manner by means of a long, substantially horizontal lever to which the free end of the brake band is directly connected and the rear end of which is developed in the form of a pad on which the operator steps. In addition to this brake pedal there is a clutch pedal, the clutch operating mechanism being of the type used on automobiles, the clutch being normally held in engagement by a spring and disengaged by pressing on the pedal.

The rear wheels are 40 in. in diameter with 12 rims to which spade lugs are secured. At the rear of the tractor there is an angle steel cross bar which is bolted to the extreme ends of the frame side members and the fenders are secured to this cross bar. The cast-iron floor, with a pyramid non-slipping surface, is bolted to both side members and the cross member of the frame.

The drawbar is of the spring type and is joined to the frame in such a way that there can be no rearing when turning corners in plowing. There are two diagonal channel steel members which are bolted to the subframe and which join together in the longitudinal axis of the tractor some distance ahead of the rear axle. It is at this point that the drawbar is attached.

Driver's Seat Mounted on C Spring

A pressed steel driver's seat is mounted on a C spring and can be swung around its supporting axis in order to enable the driver to get easily into the seat and out, and also to swing it out of the way when he wants to stand up while driving the machine. There is an arch-shaped tank support of cast iron almost directly above the rear axle. This carries the fuel tank, the magneto switch and the carbureter control.

The Dart Blue J tractor has a wheelbase of 78 in. and a tread of 52 in. measured from outside to outside of wheels. The tractor complete, but empty, weighs 4500 lb. Overall dimensions of the tractor are: Length, 125 in.; width, 56 in.; height, 65 in. The standard equipment includes a motometer, spade lugs or angle cleats and a full set of tools. Lighting and starting equipment can be furnished at an extra charge.

As in plowing the engine acts directly on the worm gear, the tooth pressures in it are no greater than in a motor truck having the same engine power and size of worm gear. All parts of the transmission are enclosed and run in oil, hence operate efficiently and noiselessly.

Government Takes Ford Hospital

DETROIT, Oct. 14.—The Government has recently taken over the new Ford Hospital which is in process of construction, and which, with its capacity for 2000 men, will be equipped to meet all requirements, the same as a base hospital in France. It is hoped that this hospital will be open for patients Jan. 5, 1919, when it will be given over almost entirely to surgical cases. The building, 750 ft. long, is built in units, and is so designed as to give maximum light; in fact, no person can get more than 22½ ft. from window space. The middle unit, when completed, will be six stories high, and the two wings four. The building is being erected on a 20-acre plot on which stand the original buildings of the Ford Hospital, which were closed to the public some time ago in order that the doctors and nurses might engage in more useful work for the Government, either in France or in cantonments in this country.

It is planned to use the new hospital as a remaking one, in which maimed will be sent to have their disabled limbs made useful. Instead of being divided into over 400 private rooms, with baths, as was the original intention, it will be divided into thirty wards, each 40 x 75 ft., and accommodating 50 men. This will permit the men to enjoy the comradeship of each other, which is desirable with such cases. When the hospital was started it was not the intention to turn it over to the Government, but now that this course has been decided upon all elaborate finishing will be neglected and no painting done. Ornamental plastering and decorating will be done when the war is over.

Partly constructed Ford hospital, which when completed will have a capacity for 2000 men. It is expected the building will be opened for patients Jan. 5. There will be 30 wards, each 40 x 75 ft. and accommodating 50 men

"Which Side Are You On?"

Employers Asking This Question Let Slip Good Opportunities

"Conditions of labor are still fluid and there is still opportunity for great advancement; we are in a most advantageous position to institute a change, to make it possible for the workman in the individual factory to take his responsibility and incentive from that factory and to secure his individual strength and his confidence from that organization, instead of the occupational labor organization, which is his only means, at present, of obtaining these things."

By Harry Tipper

THE other day, in talking with a member of a state manufacturers' association, the subject turned upon labor, as it must when manufacturing problems are uppermost. This manufacturer, who is broadminded in his business attitude, said: "I note you are writing upon labor. WHICH SIDE ARE YOU ON?"

That statement explains better than half-a-book the fundamental trouble with the whole attitude upon labor questions: the assumption that an analysis cannot be made, that there must be conflict and that it is necessary to take sides. The consequences of this are seen in the constant misunderstanding on both sides as to the reasons for the adoption of policies and practical demands, and the assumption of a belligerent attitude at every turn of events.

The object of this series of articles is to analyze the conditions and the resulting tendencies, without regard to the particular merits of any one conflict, or the particular prejudices as they exist on either side. Such conclusions as are drawn will be drawn from the analysis and will be supported by evidence that appears to be sufficient, in the writer's examination of the matter, to warrant the findings.

No discussion of this kind can proceed very far without taking some time to consider the history and the present conditions of the labor movements in this and other countries. Unless this is done the conclusions which are arrived at will be without the qualifying statements which the traditions and precedents of such history and development demand.

The labor union is a British development, and there it has been carried much farther than in any other country. Labor movements are strong in one or two of the other European countries, but the character of the movements in these countries is different on account of the fact that they have not developed purely as industrial movements but have been colored by socialistic aspirations from early stages in their progress.

Furthermore, the history of labor organization is the history of the British labor union, the first portion of that history having occurred before other countries had acquired any large manufacturing interests. It is for these reasons that Great Britain offers the best example of the direction and the immediate extent of the practical ideals which are behind the labor organization.

These ideals do not vary greatly, but the practice varies in degree in this country, so that the problem is not so acute and there is a greater opportunity for intelligent compromise. The direction is the same, however, and Great Britain, having traveled a good deal further on this same road, can point out to us some of the things we may expect if the labor question is left to its usual and time-honored course.

Just as we can determine the tendencies of extreme socialistic—collectivist—government from an examination of the results of the two most far-reaching attempts at this method —the German system of complete collectivism controlled by a vigorous autocracy and the Russian Bolshevik system carried without that control—so we can from an examination of the British conditions gain some idea of the direction in which we are moving in this country.

The conditions in Great Britain vary from those in the United States in important particulars, not only as to the progress of labor influence and organization, but as to the conditions surrounding the workers and the general attitude toward labor union endeavors.

At present the British nation, as a whole, has accepted the labor organization and has admitted the necessity for it.

In the reports of the British Commissions, which have examined into war-time industrial conditions, the necessity for strong, well-organized labor unions is frequently insisted upon. From time to time recommendations are made for the strengthening of weak labor organizations and commendations given to the stronger bodies for their value in facilitating the work. In general the hours of labor in British industrial plants are longer, the conditions of lighting, heating, and sanitation not so good as in this country. The splendid arrangements for canteen, rest, hospital, general welfare, club and other activities found in many industrial plants in this country far surpass anything at the command of the average worker over there. The opportunities for advancement are not nearly so great and the industrial system has been in action for so many years that the worker has had time to settle into a distinct class. Further, the tendency of the worker to stay in his home section and the homogeneity of the people have given this class great solidarity.

Many of the detailed reports of conditions and changes as to health measures, hours, overtime, eating, sanitation and similar matters would not apply directly to the problems as they exist with us; but even in these cases the care with which the matters have been approached and analyzed leads to some general conclusions which are of great importance, apart from the detailed figures, to every large industrial operator.

The broad position of labor in the industrial and political life of Great Britain suggests many things in the acceptance and practice which may foreshadow the things we shall be called upon to meet.

Most Trades Strongest

In the most important trades, the railroad, iron and steel, machinery, textile, mining and maritime, the labor organizations are much stronger than they are in this country in all respects. They count among the members of the labor unions a much larger proportion of the workers, in many cases a large majority. They have had long years of unbroken development and they are well managed. They possess an influence over the industrial life of that country which is almost a definite control. With these important trades so thoroughly intrenched in unionism, the organization of the thousand and one subsidiary trades has gone ahead at a rapid pace in the last decade or so.

It is now about 20 years since these labor organizations began to secure representation in Parliament and the fact that labor members have been holding cabinet positions since the outbreak of the war is significant of the importance and influence of labor in politics. It is true that we do not have any labor party in this country, or any appearance of one, but the influence of labor organizations on politics is indicated by a number of things which have happened and this influence has not lessened any during the war—so that, even though we may never have a labor party, we must regard it as certain that labor influence in politics, once felt, will grow here as it has in Great Britain, perhaps with more rapidity.

In the important trades mentioned previously, the shop procedure as to hours, overtime, restriction of output, holidays, settlement of disputes, etc., is governed thoroughly by labor union decision and practice in Great Britain. In this country, the influence of labor has not been felt to the same extent, but again, such influence as has been exerted has concerned itself with hours, overtime, holidays, production and the same general ideas as indicated in the labor action on the other side. As this influence extends in this country, the direction of its extension is plainly marked by the conditions exhibited in the older country.

Not only is it true that in the most important trades all these questions are handled through the labor union and under labor union rules, but it was necessary for the British Government, in order to get the necessary war-time production, to agree that all changes in the practice as to hours, overtime, limitation of output, etc., should cease as soon as the war was over and the pre-war practices be considered as governing the working conditions again.

Shop Steward's Work

One of the special features of skilled labor and recently of unskilled labor organization practice in British manufacturing is the shop steward. This is a member of the union who is selected for the purpose and whose time is paid by the other workmen of the trade in the shop. The job of this steward is to see that all the workmen live up to the union rules and to see that the foreman does likewise. All disputes between the individual workman and the foreman go through this shop steward and to him come all complaints of the management. He has no relation to the labor organization, except that he is a logical outcome of the intense interference of the labor organization with the details of shop practice, the official who must see that this mass of detailed by-law on practices is observed both by workmen and employers.

A diligent reading of the reports which have been gotten together on the industrial necessities during the war will indicate the thoroughness with which labor has interfered in the formation of every detail of manufacturing practice. The most significant part of the matter is the acceptance of the labor union's right to do these things and the necessity for the consultation of the organization upon all these matters.

Perhaps this recognition of the right of labor to have a voice in all that concerns its conditions of work is the most valuable part of the whole matter. That question seems to have been laid away in Great Britain. The manner of its demise may involve the industrial future of the country as seriously as the question itself, but that fact can be stated as genuine progress in industrial relations.

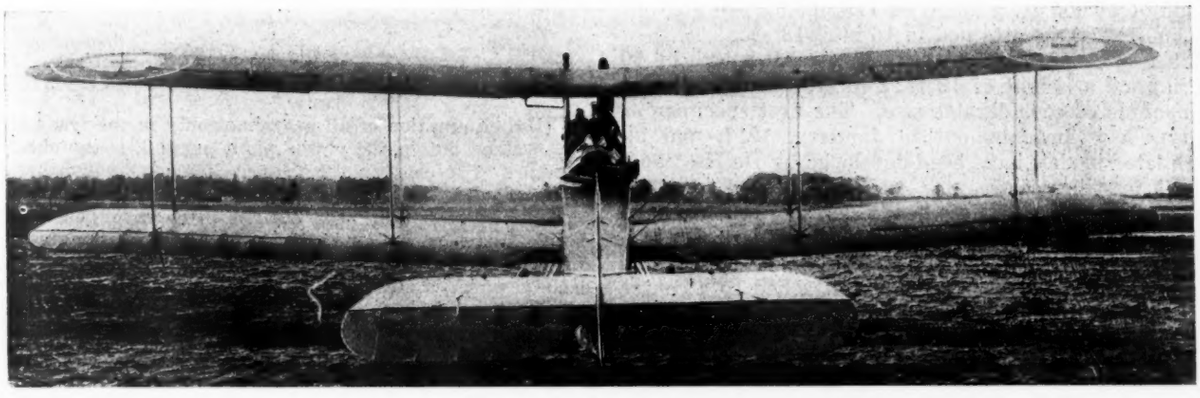
But there are many things which have come out of the strength and development of the labor movement in Great Britain which are so questionable in their desirability and so doubtful in their efficacy

that we would better escape them if we can. The solution to the problem of satisfied labor has not been found in their more completely unionized industries, for they are still burdened with strikes and other marks of economic warfare. More complete unionizing has handed a much larger measure of control to the worker, but does not seem to have increased the good feeling between employer and employee and does not appear to have made for a greater organization esprit de corps.

Evidently we should be better advised to attempt other ways of solving the matter. If we leave the labor question to develop through the warfare between labor organization and manufacturers' organization, we must expect that labor organization will grow by virtue of the necessities of that warfare.

In that case we must expect that it will gain a larger control as it has in Great Britain, that its political influence will be greater along the lines of its present development and that we shall be involved in a more serious stage of the warfare, with less profit in it, with less chance of avoiding complete defeat and with less probability of the success of any other scheme. The longer the organized bodies continue to fight for control of these matters the harder will it be to come to peace instead of armistice.

BECAUSE OF THE FACT THAT THE MOVEMENT IN THIS COUNTRY HAS NOT YET ATTAINED THE STRENGTH WHICH IT HAS DEVELOPED IN THE OLDER COUNTRY, BECAUSE THE CONDITIONS OF LABOR ARE STILL FLUID AND THERE IS STILL GREAT OPPORTUNITY FOR ADVANCEMENT, WE ARE IN A MOST ADVANTAGEOUS POSITION TO INSTITUTE A CHANGE, TO MAKE IT POSSIBLE FOR THE WORKMAN IN THE INDIVIDUAL FACTORY TO TAKE HIS RESPONSIBILITY AND INCENTIVE FROM THAT FACTORY AND TO SECURE HIS INDIVIDUAL STRENGTH AND HIS CONFIDENCE FROM THAT ORGANIZATION, INSTEAD OF THE OCCUPATIONAL LABOR ORGANIZATION, WHICH IS HIS ONLY MEANS, AT PRESENT, OF OBTAINING THESE THINGS.



Rear view of the latest model De Haviland 4, showing the rear cockpit for the observer

Features of the De Haviland 4

Has Been Fitted with Engine of from 200 to 400 Hp.—Fitted with Two Machine Guns, One Firing Through Propeller, the Other Mounted on a Ring Surrounding the Observer's Cockpit

AN important place in the American air program has been assigned to the De Haviland 4, a machine of British origin, to which frequent reference was made in a recent discussion in connection with the aircraft investigation. We have already printed a technical description of this machine, and are now in position to show a number of photographs, which will make its form more familiar to the reader.

The De Haviland 4, which was designed by Geoffrey De Haviland, chief engineer of the Aircraft Mfg. Co., is a tractor biplane, serving for reconnaissance and bombing. The machine has been fitted with a variety of engines, including a 200 hp. B. H. P., a 270-hp. Rolls Royce, a 260-hp. Fiat and a 375-hp. Eagle Rolls Royce, and those being built in America are, of course, being fitted with the Liberty engine. The plane seats two persons, the pilot and the observer, and its armament consists of one Vickers machine gun, operated synchronously from the engine through a Constantinesco interrupter gear, and a Lewis gun. For the Vickers 600 rounds of ammunition are carried, and for the Lewis 10 drums. The total weight is 2945 lb., and the load carrying capacity for bombs amounts to 400 lb.

We have been furnished with some figures regarding the performance of the machine, but in this connection it is not stated with what engine these performances were accomplished. It is, of course, obvious that with a 375-hp. Eagle Rolls Royce the speed and climbing ability

Three-quarter front view of the De Haviland 4. Most of these are fitted with four-blade propellers with the machine gun synchronized to fire through the blades

will be much greater than with a 200-hp. engine. Presumably the figures apply to a plane equipped with the largest of the engines mentioned, the 375-hp. Rolls Royce. It is stated that at an altitude of 10,000 ft. the machine has an endurance of 4½ hours. Its ceiling is 17,000 ft. At ground level it has a speed of 117 m.p.h., and at an altitude of 10,000 ft. a speed of 113 m.p.h. An altitude of 10,000 ft. can be attained in 16 min. 18 sec.

With a span of 42 ft. 4½ in., an overall length of 30 ft. 2 in., and a height of 10 ft. 2 in., the De Haviland 4 is a machine of considerable size. The first specimen of this type was brought out in January, 1917, and although later models have been developed by De Haviland, the DH4 is still in active use. As will be seen from the side view, the upper wing has a considerable forward stagger, which amounts to 6½ in. There is no sweepback, but both sets of wings have a dihedral angle of 174 degrees. The upper wings are attached to a center section 2 ft. 3½ in. wide, while the lower planes connect directly to the body or fuselage. The notable feature of construction is the slight camber of the wing ribs. The webs of the wing ribs consist of three-ply wood, and are secured to the flanges by means of brass tacks.

In the construction of the body, considerable use is made of ply wood. The forward part of the body up to a point behind the gunner's cockpit, is made without the use of diagonal bracing, and is covered by ply wood. The formers, as well as the support for the controls and machine guns, are made of ply wood, some of which is as much as 1 in. thick. The longerons are of spruce, and the engine bearers of ash.

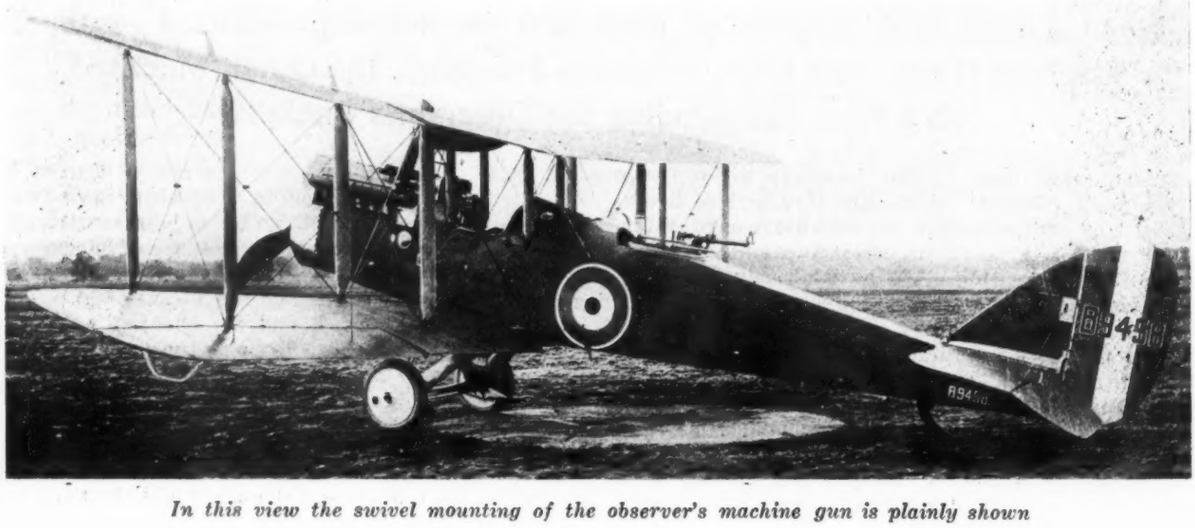
Most of the De Havilands are fitted with four-blade propellers, but some of them have been fitted with two-blade propellers.

The Peterson-Culp "Super Steamer"

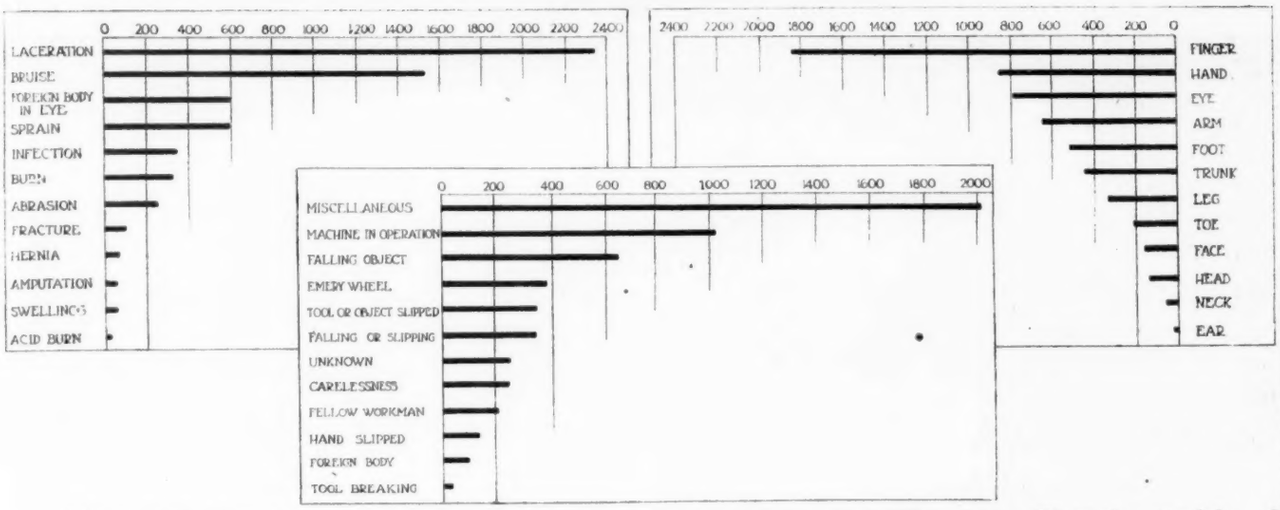
THE elimination of all gears, not only in the transmission system, but in the power plant as well, is the chief feature of interest in the "Super Steamer," which has been brought out by the Peterson-Culp Gearless Steam Auto Company of Price, Utah. The designs provide for the use of a double steam engine, or rather a pair of steam engines built together with a common crankcase but separate crankshafts, each of which is directly connected to one of the rear driving wheels. By this construction, it will be seen, no differential gear is necessary. Each of the two engines has two cylinders of the double acting type with a bore of 3¼ and a stroke of 5 in. The crankshafts run on ball bearings.

The boiler is of the fire tube type, 23 in. in diameter with more than 100 sq. ft. of heating surface. Kerosene is used for fuel and the tank has a capacity of 25 gal. It is attached at the rear of the chassis.

A honeycomb type condenser makes it possible, it is said, to run 200 miles on one filling of the 30-gal. water tank.



In this view the swivel mounting of the observer's machine gun is plainly shown



These charts show the various kinds of accidents sustained by employees in Cadillac plants. Through a careful analysis of such charts, together with the application of the proper remedial and protective measures, the number of accidents has been very greatly reduced

Accidents in Cadillac Plants Lessened

Statistics Show That Young Men Suffer Accidents More Frequently Than the Older Ones and Married Men More Frequently Than Single Ones—Classification of Accidents and Their Causes—Rendering Sandblasting Less Injurious

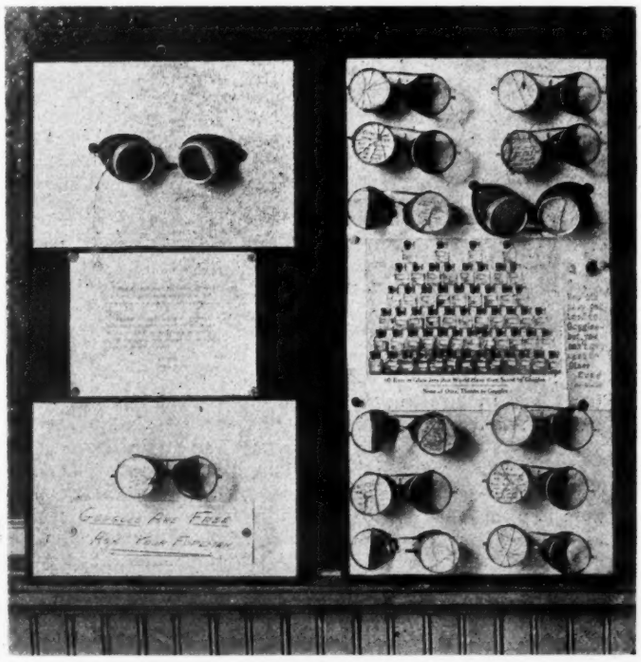
A VERY interesting compilation has been made by the Safety Department of the Cadillac Motor Car Co., Detroit. One of the diagrams shows the comparative number of accidents for men of different ages. Young men suffer most from accidents. This can be taken to mean that older men are more careful. The largest number of accidents recorded at any one time among men between the ages of 20 and 30 is 148, while that among men over 40 years of age was only 127. The largest number of men between 30 and 40 years of age who sustained injury through accidents during the same 5-year period was 45. All these accidents occurred during the year 1913, since which time a general decrease has been noted.

One of the other diagrams reveals the fact that accidents are more frequent among married men, although the line representing accidents to single men is not widely separated from the other. A chart giving the nationalities of the victims of accidents is rather misleading. As the biggest proportion of the employees at the plants are American it is to be expected that the greatest number of accidents will befall them, but the conclusion should not be drawn that the proportion of accidents to the number of workers is greatest among Americans. In other words, this chart must not be considered from a percentage standpoint.

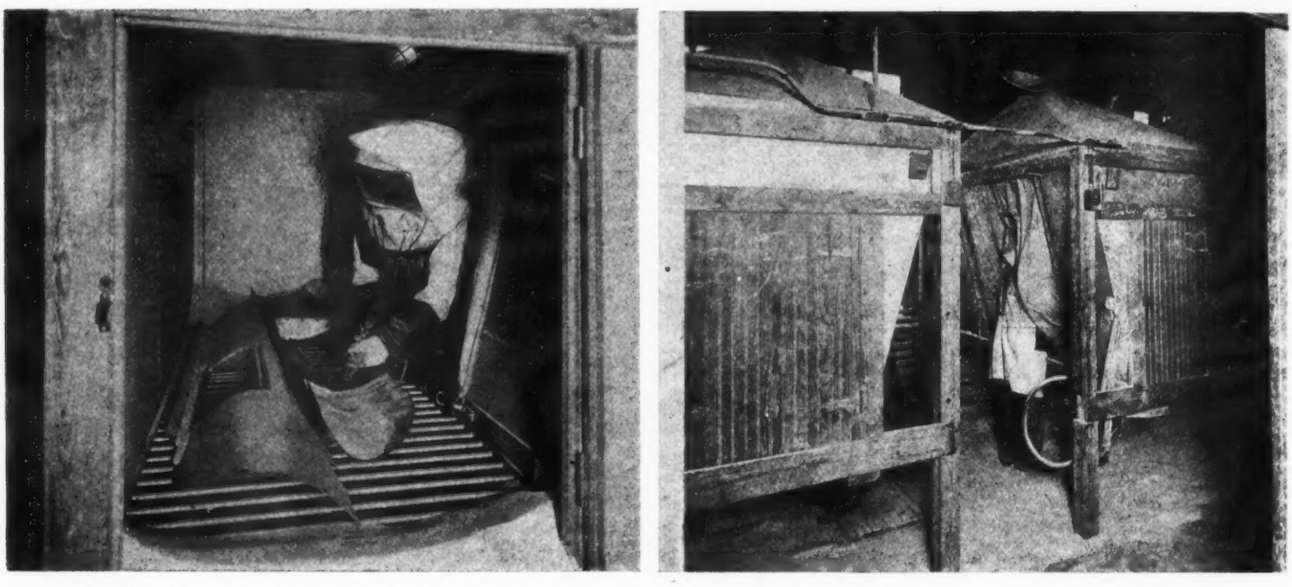
During the 5-yr. period 1913 to 1918 the greatest number of injuries reported were cases of laceration. A total of 2350 are reported on the chart. Bruises were sustained by 1530 persons. Sprains and cases of foreign bodies in the eyes total about equally—600.

About 1064 accidents occurred on machines which were in operation; 630 persons were hurt by falling objects; 273 workmen suffered injury by fellow workmen, while about 285 accidents resulted through carelessness and could have been avoided. Cases of tools breaking were the smallest in number, only thirty being recorded during the 5-year period above mentioned.

Of all injuries, those sustained to fingers were highest in number, totaling more than double those which the hand suffered during the same period. Nearly 860 accidents to



An exhibition of broken goggles which tells a mute tale of eyes that have been saved. Bulletin boards similar to these are hung in various places throughout the plant



Sandblasting is done in individual enclosures, and each operator is thoroughly protected from dust. At the left is shown the inside of such a compartment, and at the right is shown the external appearance

the hand were reported, while injuries to the fingers totaled 1820. Injuries to other parts of the body were less in number. Only 10 cases of ear accidents were reported.

Through the aid of the safety department, which has introduced safeguards throughout the various plants wherever necessary, accidents have been greatly reduced. The company offers the following figures showing the percentages by which accidents of various kinds were reduced during the period 1912 to 1916:

Nature of Injuries.	Percentage of Reduction
Grinding	40%
Tool slipping	55%
Bad practices	31%
Hand slipping	67%
Carelessness	78%
Machines in operation	48%
Fellow workmen	71%

One of the most unhealthful occupations was that in the sand-blast room. Breathing the sand-filled air was very injurious to the workers' lungs and the men would stay away from work several days at a time. It was necessary to have a staff of fourteen men for this job in order to maintain a working force of twelve men. Production in this department was very uncertain, the foreman never knowing how many men he would have from one day to the next.

It was, therefore, necessary to devise some scheme which would prove more satisfactory to both the workers and the company. The men worked in a large room which was partitioned off in stalls, with one man in each stall. The partitions extended only about 7 ft. in height and offered the sand an opportunity to fill the room to such a degree that men breathed large quantities of sand, which soon affected their health.

Now individual booths are provided for the men, and all sand is confined within the walls. The men work entirely outside of the booths. After inserting his work into the booth, the worker steps before an apron and slips his arms through sleeves which permit him to handle the work on the inside. His head fits in a helmeet arrangement with a glass opening permitting him to inspect his work.

Increased Production of Artificial Abrasives

A MARKED increase in the output of artificial abrasives in the first half of 1918, as compared with the first half of 1917, is shown by figures compiled by Frank J. Katz, of the United States Geological Survey, Department of the Interior, and obtained in co-operation with the Mines Branch of the Canadian Department of Mines. There was little change in the output of corundum and a decrease in the output of emery in the United States.

During the first half of 1918 emery ore was produced by seven operators in the Peekskill district, in New York, and by one in southern Virginia. Corundum is produced from one mine in Macon County, N. C., and by one company operating in Renfrew County, Ontario.

The combined mine output of emery and corundum in the United States and Canada from January 1 to June 30, 1918, was 5455 short tons. During the same period the producers sold, shipped, or used in the manufacture of abrasive articles approximately 4500 short tons, and the stock on hand at the mines June 30 was about 1500 short tons.

As compared with the same period in 1917, there was a large decrease in the quantity of emery mined, and the output from January to June, 1918, inclusive, was considerably less than half of the mine output of emery for the entire year 1917. During the first half of 1918 corundum was produced at about the same rate as in 1917.

Artificial carbide abrasives, including carborundum, crystolon and carbolon, were produced during the first half of the year 1918 by two companies in the United States, operating plants at Niagara Falls, N. Y., and at Blasdell, N. Y., and by three in Canada, operating plants at Shawinigan Falls, Quebec, and at Chippewa and Thorold, Ontario.

The plant output of crude carbide abrasives was 6583 short tons. During the same period the producers sold or used in the manufacture of abrasive materials 5633 tons, and on June 30 there remained in their hands as stocks 2840 tons.

Aluminum oxide abrasives, including alundum, aloxite, exolon, lionite and natite, were manufactured in the United States by four companies, three of which operated plants at Niagara Falls, N. Y., and one at Blasdell, N. Y., and in Canada by five companies, which operated plants at Niagara Falls, Chippewa and Thorold, and two at Hamilton, Ontario.

The combined output of these plants in the first half of 1918 was 28,341 short tons. During the same period the producers sold or used in the manufacture of abrasive materials 28,161 short tons, and on June 30 there remained in their hands 26,221 short tons.

Electric Dynamometers for Aircraft Engine Tests

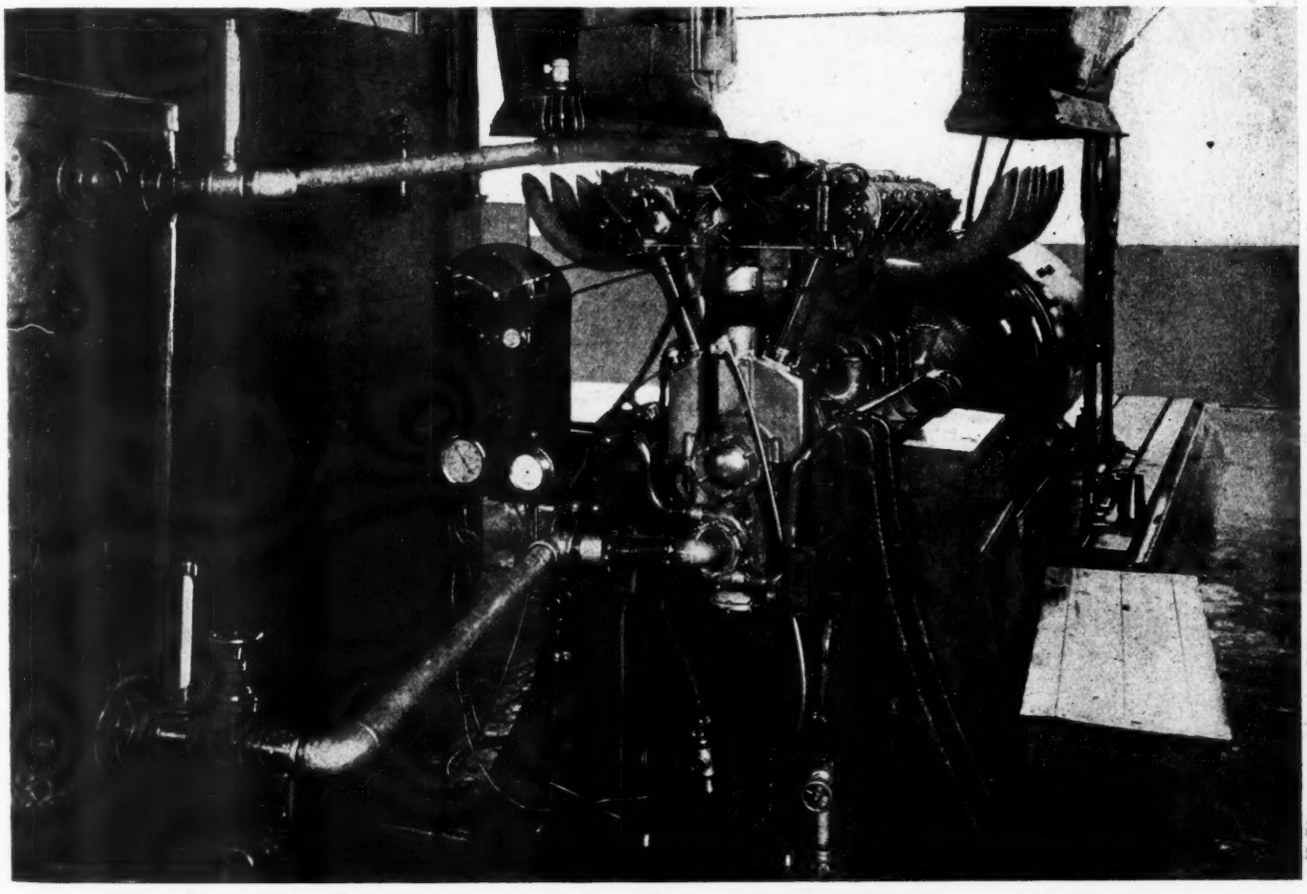
Sprague 300 and 450 Hp. Dynamometers Capable of Handling Heavy Torque—Larger Type Particularly Suitable for Testing Liberty Engines

TESTING the Liberty engine and other big aircraft power plants has necessitated the development of electric dynamometers of much greater capacity than those in use up to a year ago. The club test, as the fan dynamometer test is often called, has not proved to be reliable, and as a result of this there has been a strong demand for airplane dynamometers. The Sprague Electric Works are putting out two sizes for this work. The larger size has a nominal rating of 300 hp. at 1325 r.p.m. and a maximum rating of 450 hp. at 1700 r.p.m. The safe permissible maximum speed is between 2500 and 3000 r.p.m. This size is particularly adapted for testing the Liberty engine.

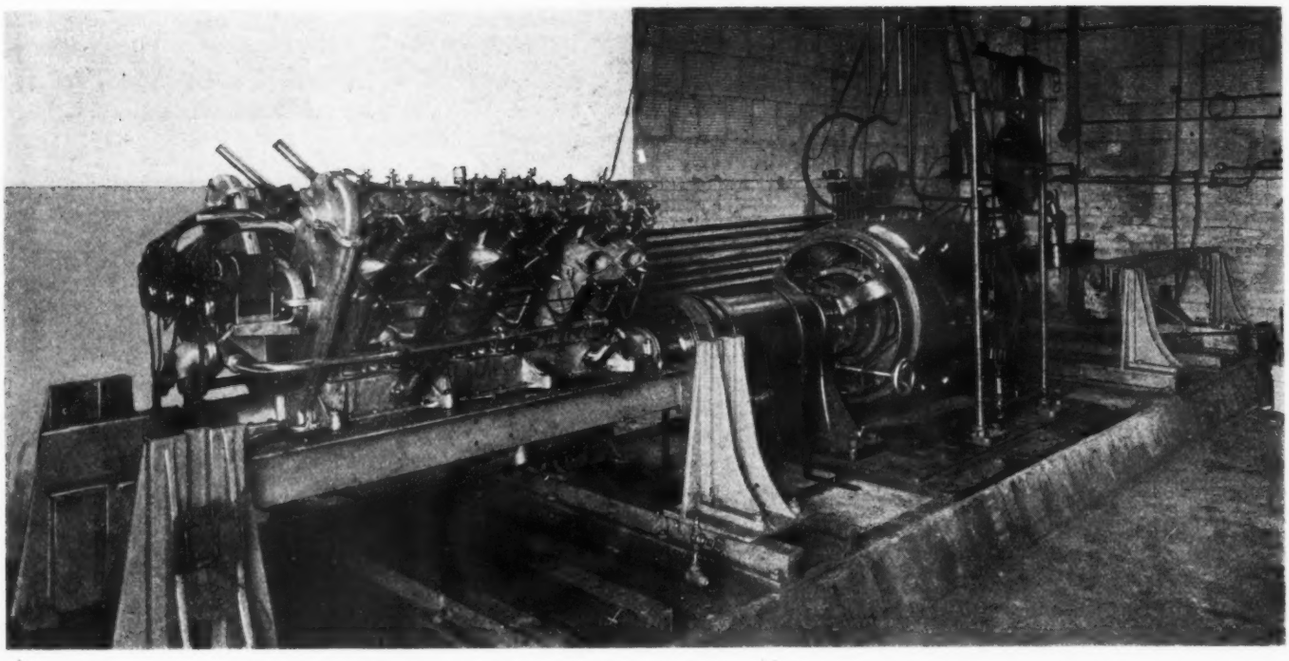
The smaller machine is ideal for testing the engines for advanced training planes and speed scouts. It has a nominal rating of 200 hp. at 1300 r.p.m. and a maximum rating of 300 hp. at 1650 r.p.m. The maximum free running speed is between 2500 and 3000 r.p.m. Combinations are frequently made of two of the smaller machines for testing up to 500 hp. and of two of the larger machines for testing up to 800 hp. For such tandem combinations the electrical control and torque measuring system has been worked out so that the torque is read on a single scale and the load is controlled by a single handle, just as in a single-unit machine.

These dynamometers are fitted with shaft extensions at each end, so that one engine can be set up and gotten ready for test while the other is being run. The shaft extensions are tapered to facilitate the fitting and removal of the necessary couplings.

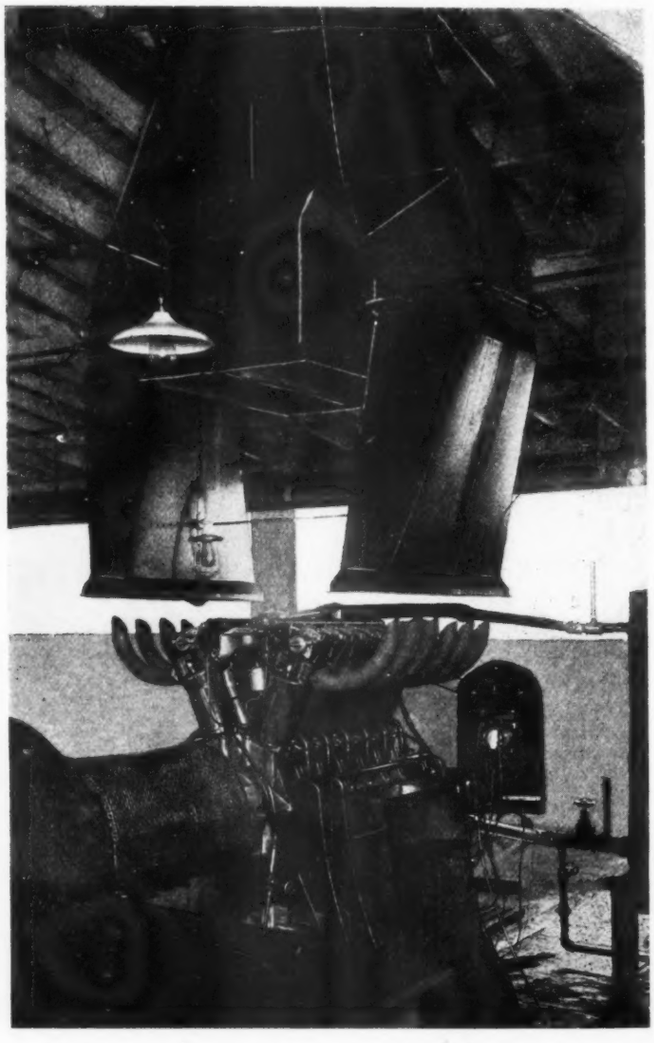
Torque measurements are usually taken on heavily constructed beam scales, as built by the Chatillon Co., and fitted with a spring balance in series for quick indications. The Toledo Scale Co. has developed an automatic control



A 12-cylinder Liberty engine on a Sprague dynamometer testing stand at the Trego plant. The photograph shows a part of the exhaust hoods and the complete water system for cooling the engine



Wisconsin 200-hp. airplane engine connected to 300-hp. Sprague dynamometer



Showing the exhaust hood used in testing the Liberty engine at the Trego plant

indicating dynamometer scale which is very well adapted for this work, and installations of this scale are being made in a large number of plants.

Use Individual Rooms

Where a number of dynamometers are installed for production testing, they are mounted in individual rooms, and in each room provision is made for carrying off the exhaust gases, to eliminate any fouling of the intake air. The Ford and Lincoln companies have large numbers of these rooms for testing 100 or more Liberty engines at one time.

The engine on test is mounted on four cast-iron stands, carrying wooden engine bearers similar to those used in the plane. Rigid supports are essential to prevent vibration.

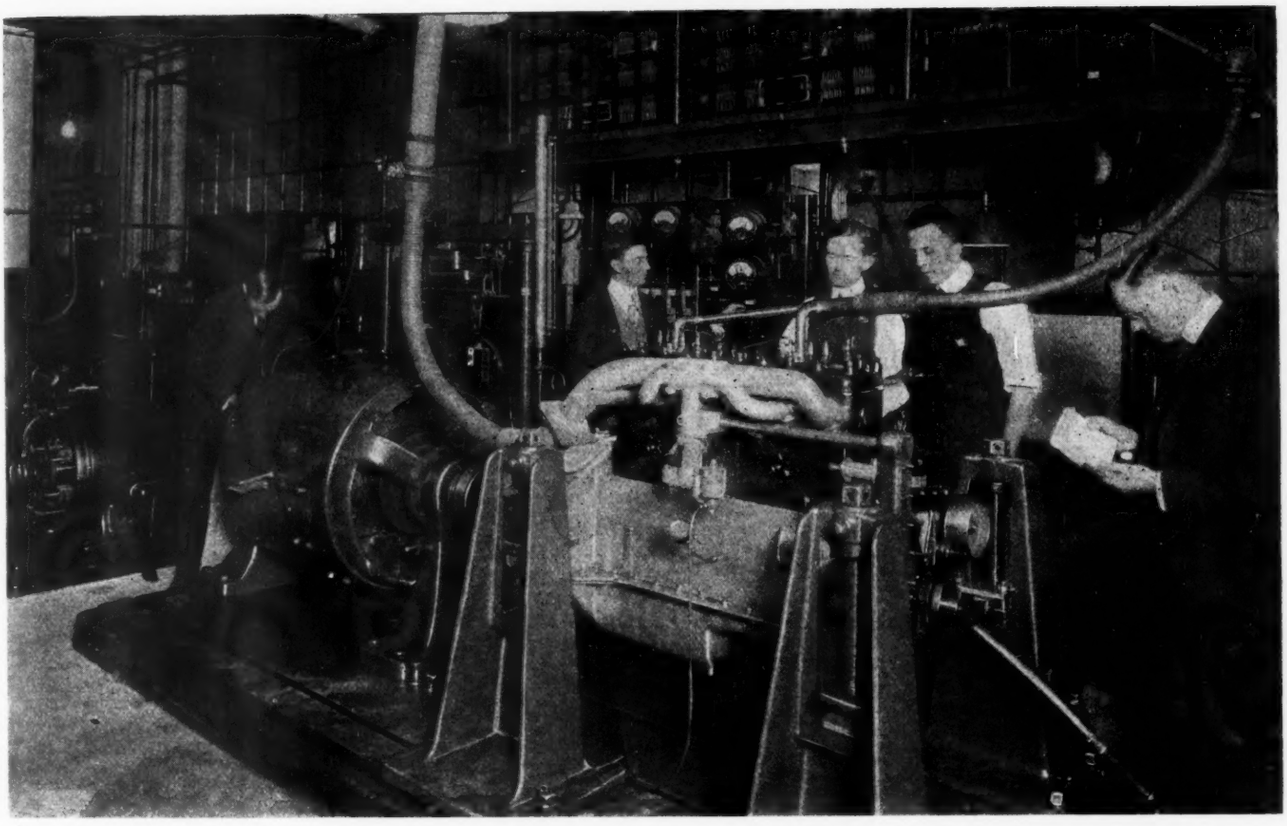
The coupling usually used is a double-flange coupling with transmitting members of Thermoid discs 15 in. or more in diameter. It is essential that the coupling be strong enough for the load and at the same time sufficiently flexible to take up slight differences in alignment. The coupling is balanced throughout and is built with a considerable flywheel effect, which is essential in testing airplane engines, even of the twelve-cylinder type.

In the earlier days of electric-dynamometer testing some engine failures were attributed to the rigidity of support and the heavy weight of the testing machine, but later investigations have demonstrated that a properly installed dynamometer equipment produces no ill effects whatever upon the engine, and an engine that is properly built for service in flight will show up well on dynamometer test.

Follow Cube Law

In conducting dynamometer tests it is important that the loads at different speeds follow approximately the speed-horsepower curve of the propeller that would be used with the engine. This follows the cube law. For example, if the load were 400 hp. at 1700 r.p.m., the engine should only be loaded in routine test to about 90 hp. at 1000 r.p.m.

It is claimed that results obtained on torque stands



Engine for Class B government military truck on dynamometer testing stand in the experimental room of the Continental Motors Corp.

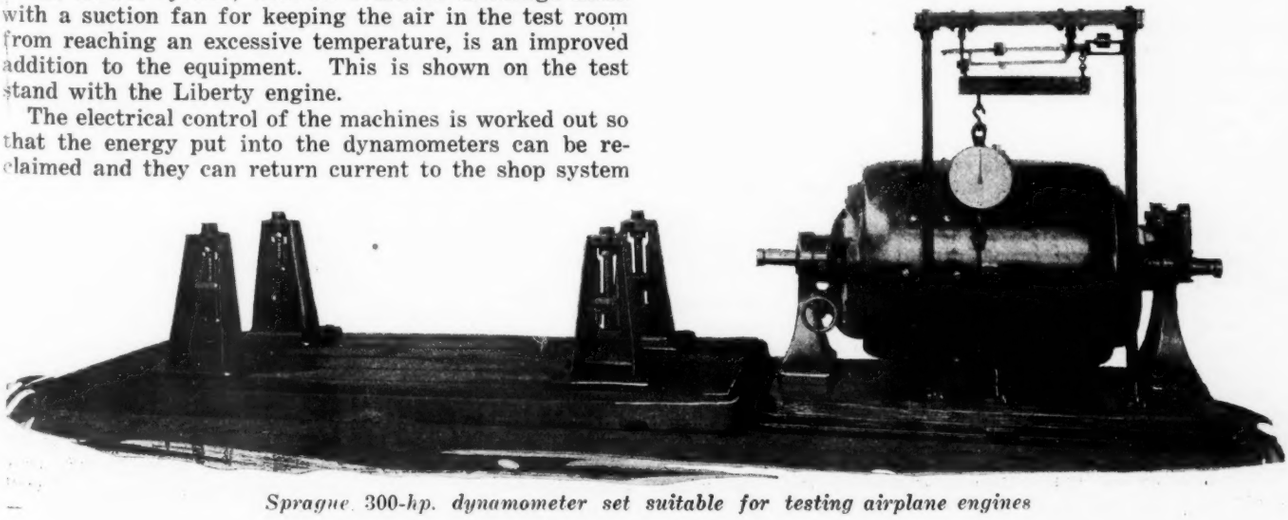
with clubs or propellers frequently vary as much as 10 or 20 per cent from the true horsepower output, and that with calibrated clubs or rigid stands the variations have been known to be even greater. With electric dynamometers much greater accuracy is secured.

With modern types of aviation engine no difficulty is experienced in keeping the engine cool during the dynamometer test. Water is circulated through an external tank, which is kept overflowing with cold water, so that the intake temperatures are maintained the same as in flight. In the larger engines it is the practice to pump the oil through an external radiator, and the intake and outlet oil temperatures can be maintained at the same values in actual service.

The blower system, with an overhead discharge fitted with a suction fan for keeping the air in the test room from reaching an excessive temperature, is an improved addition to the equipment. This is shown on the test stand with the Liberty engine.

The electrical control of the machines is worked out so that the energy put into the dynamometers can be reclaimed and they can return current to the shop system through a fairly wide range of speed, usually from 1300 to 1700 r.p.m. For that part of the test which is conducted below 1300 r.p.m. the current is diverted into a resistor. The resistor, however, has sufficient capacity to take the entire load of the machine under conditions where it is impracticable to pump back. The control is worked out so that the adjustment of load and speed can be accomplished entirely by means of a field rheostat handle. There is one main rheostat handle and concentric weight and small handle operating an auxiliary rheostat of low resistance which gives fine adjustments of speed and load between the steps of the main rheostat. Automatic means are provided for short-circuiting the mag-

(Continued on page 696)



Sprague 300-hp. dynamometer set suitable for testing airplane engines

Air Cleaners Analyzed and Compared

Four Types of Cleaners Are:

1—Cloth or Screen Type
2—Inertia Type
3—Liquid Type
4—Centrifugal Type

Efficiency of Liquid and Gravity Types Approximately the Same—Liquid Types Because Water Aids in Carburation

By W. G. Clark, M.E.*

THE trend of engine design in the tractor and automobile field during the past few years has been more along the lines of increased efficiency of prevailing types rather than toward the development of new types of engines.

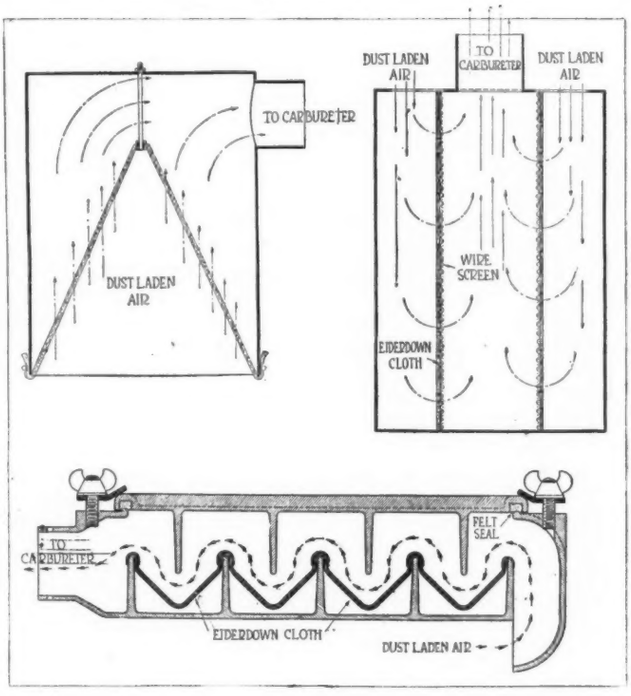
That is but a natural stage in the development of a mechanism so young as the internal combustion engine, although the demand for better efficiency has perhaps been hastened and rendered more necessary by the war. The demand for more efficiency naturally fell first on the accessory making people, especially the makers of magnetos, carbureters, bearings, etc.; and the fact that it required some time to make any appreciable progress was due to too much of the burden being shifted to the accessory firms. It is gratifying to note the rapid progress being made since the motor designers are co-operating with us and taking over their share of the work.

One of the most important single factors making for better efficiency and service in automotive work was the early recognition of the fact that dirt and carbon are the worst enemies of the internal combustion engine. Changes in design along protective lines and the application of external preventive means in the form of air cleaners have done much toward increasing the operating efficiency and life of our field engines.

The importance attributed to air cleaners by engineers and manufacturers is attested by the fact that fully 80 per cent of the tractors and several trucks furnish air cleaners as standard equipment. The specifications of the U. S. Army for trucks and tractors call for adequate air cleaning devices for the carbureters. To everyone familiar with internal combustion engines, the destructive power of dirt and other incombustible mineral matter in the cylinders is well known, so that as a means of preventing access to the cylinders of such destructive agents, the air cleaner now ranks as a most important part of field equipment.

The earliest form of air cleaner was merely a fine mesh screen of considerable area attached to the carbureter air intake. This was used several years ago but was not very efficient or satisfactory for obvious reasons.

Another of the earlier forms of cleaners was called the rain type, of which the modern air washer or water cleaner is a development. It was a modified form of the washers and humidifier used for cleaning and moistening air in public buildings. The cleaning was accomplished by drawing the carbureter air through a fine film or sheet of water which flowed over a screen to a reservoir and back. It was very cumbersome and impractical for field use, although if well made it was quite effective.



Figs. 1, 2 and 3—Three forms of screen-type air cleaners in which flannel or eiderdown cloth is used. In the upper ones the dust laden air is drawn through the cloth. In the lower one the dust is collected on the surface without passing through

*Engineer of the Wilcox-Bennett Carbureter Co. The paper published here was read at the recent meeting of the Minneapolis Section of the S. A. E.

There are several types of cleaners now in use on tractors and trucks:

No. 1—Cleaners employing cloths or screens or both to catch the dust.

No. 2—Inertia cleaners.

No. 3—That class in which water or some other liquid is used to wash the air.

No. 4—Centrifugal or gravity cleaners.

Screen Type Cleaners

No. 1 type, those which depend upon a cloth or screen, are practically obsolete, and rightly so, as they are troublesome, ineffective and bulky. In order to clean efficiently the cloth or screen area must be very large in order to cut down the air velocity and also to provide any considerable capacity. A cloth or screen soon clogs and restricts the flow of air to the carbureter, thus enriching the mixture. This creates carbon, causes overheating and other kindred troubles. There have been numerous forms of this type cleaner.

Fig. 1 is a type with just a cylindrical drum closed at one end and connected to the carbureter, and covered at the other end by an eiderdown cloth held in the shape of a cone by a wire at the top. The air is drawn upward through the cone of eiderdown and thence into the carbureter. In dusty field work with this cleaner the operator would have to clean the cloth very frequently or else carry a bale of clean cloths for the many changes necessary in a day's run. The type shown in Fig. 2 also employs an eiderdown or flannel cloth, but has an additional feature over Fig. 1, in that the air is forced to reverse its direction several times in passing around baffle plates. These baffle plates are intended to direct the dust-laden air into contact with the cloth.

Fig. 3 shows a cleaner employing both cloth and screen, although I rather think the screen is meant only as a means of holding the cloth in place. No provision is made for taking it apart for cleaning, which possibly is one reason we don't see many of these cleaners in use.

The second class of air cleaners I have called inertia cleaners, because their action depends on the inertia of the dust in the air to carry it out of the air stream when the air flow is suddenly reversed or changed before passing to the carbureter.

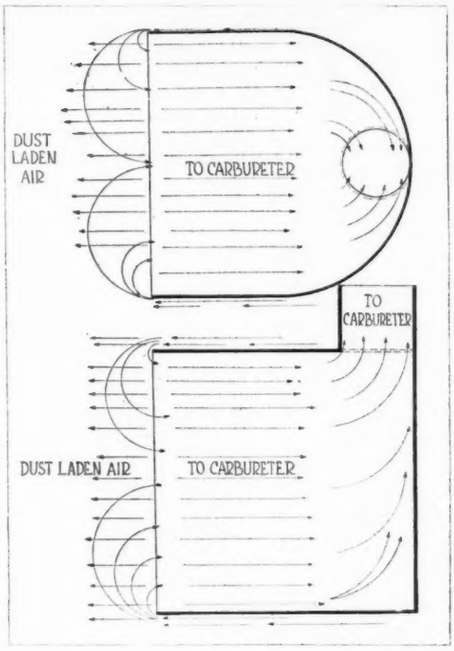


Fig. 4—Simple form of inertia air cleaner, the open end of which is placed on the outside of the radiator. The principle of this cleaner is that the suction of air through the radiator entrains dust particles

One form of this type of cleaner of which there are now several varieties is shown in Fig. 4. It consists of a metal casing with one side open and of rectangular shape, with a connection from the closed side to the carbureter. The open side of the casing is placed against the outside of the radiator core facing in the direction of air flow through the radiator, so that the carbureter air is drawn out of the air stream in the reverse direction. The inertia of the dust in the air being drawn through the radiator is supposed to carry it beyond the open end of the cleaner and through the radiator instead of being deflected from its path by the suction of the carbureter.

The actual efficiency of this cleaner is rather problematical, as it is very difficult to determine it since the dust cannot be measured or caught in any way. Practically the only way to test it would be to try it on an engine in the field and judge its efficiency by the condition of the cylinders.

In another form of inertia cleaner, in many respects similar to this one, the cleaner is placed behind the fan—instead of in front of the radiator so that the air is forced through the cleaner instead of being drawn through. Its efficiency, however, is dependent upon the maintenance of a certain air velocity for a given proportioning of the cleaner openings, so that a variation of fan speed interferes seriously with its effectiveness. I have no data available on these forms of inertia cleaners, but I believe that there must be a considerable volumetric loss with their use due to the fact that the carbureter air must be drawn in a reverse direction from that of the fan air stream, which possesses the kinetic energy and inertia of its velocity and direction of flow.

The third type of air cleaners comprises those cleaners or washers in which a liquid such as water or kerosene is em-

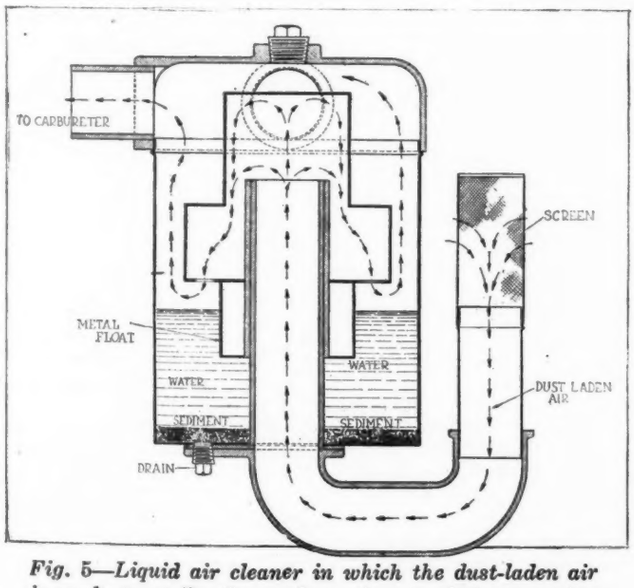


Fig. 5—Liquid air cleaner in which the dust-laden air is made to strike the surface of water before passing through the carbureter

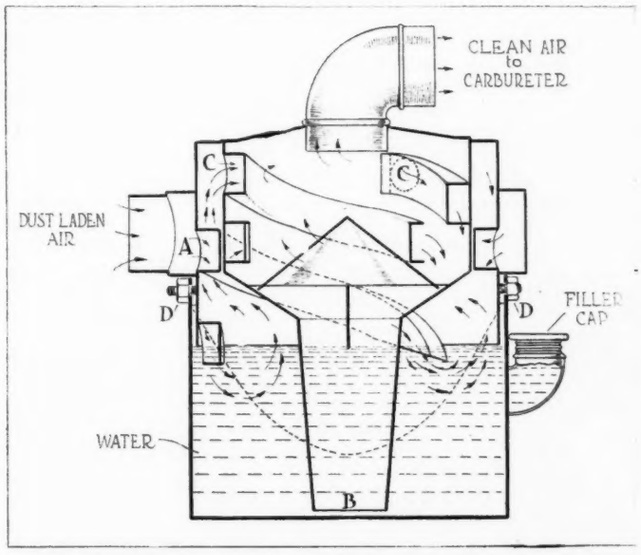
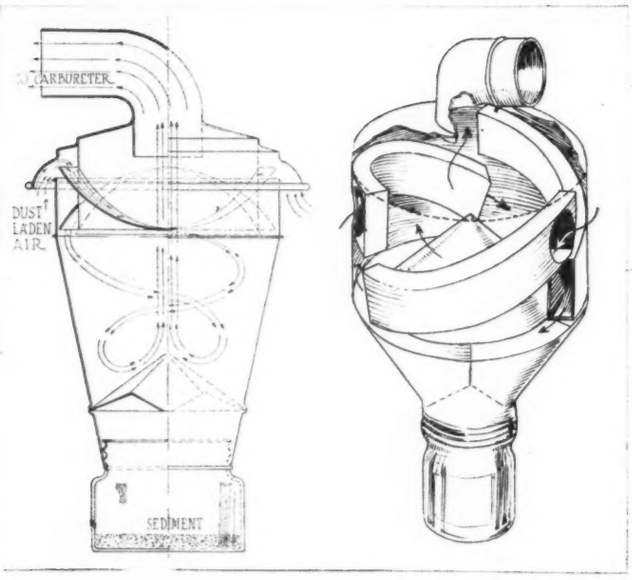


Fig. 6—Wilcox-Bennett air cleaner, in which the air is directed to rapidly whirling water in the lower compartment through spiral passages



Figs. 7 and 8—Two types of air cleaner in which the dust particles are thrown out by centrifugal force and collect in a container at the bottom of the device

ployed to trap the dust. The demand for an air washer or wet type cleaner was created primarily by engine operators and owners of tractors in exceptionally dusty territories, who felt that other types of cleaners were not efficient enough for adequate engine protection. However, judging from data on most of the best air washers and dry type cleaners, I do not believe that the slight advantage of the wet type over the best dry types is sufficient to compensate for the extra troubles and difficulties encountered in the use and care of a wet type cleaner.

The best dry type cleaners will catch from 95 to 100 per cent of the dust passing into them, the efficiency varying with the fineness, weight and volume of the dust.

Under the most adverse conditions for the dry type, the best air washers will show not more than 2 or 3 per cent better efficiency. Such conditions are most frequently encountered in some of our Western States where the dust is largely composed of volcanic ash, or lava dust. This dust is very light and fine, which makes it hard to stop. It also contains considerable vegetable matter, so that of the small percentage of it which escapes the dry type cleaners, the major portion is combustible vegetable matter that will burn in the cylinders without deposit.

Many have been misled as to the efficiency of the air washer by comparing them to building air washers and humidifiers; while the action is somewhat similar, they differ in a very important respect. The ordinary building air washer deals with air at low velocities through which finely divided water particles are passed. The carbureter air washers deal with air at high velocities which must be pulled through a quantity of water.

In one case the surface of a large number of water particles comes in contact with a slowly moving volume of air affording ample time, when properly designed, to thoroughly wash all the air. On the other hand a volume of air is forced through the water at high speed. This forms air bubbles while passing through the water, which trap within themselves particles of dust. These dust particles never get in contact with the water and are carried through into the carbureter. The best carbureter air washers are those in which these air bubbles are broken up and reduced to a minimum. The presence of these air bubbles accounts for the fact that even the best air washers are not always 100 per cent efficient, especially in the extreme conditions of which I have spoken.

I know of two carbureter air washers which are not so efficient as some dry type cleaners because of this defect. Under ordinary field conditions the difference in efficiency between the wet and dry type cleaners is very slight. I think that if the truth were known the majority of tractors now using the wet type cleaner do so on account of the moisture which they furnish to the intake air, rather than on account of any real appreciable better operation over the dry type cleaner. For some motors which do not cool any too well, especially when using kerosene, the heavily moistened and cool air from a water cleaner is almost as much a necessity as its freedom from dust. This heavy moisture content which some air washers impart causes a large water consumption, the amount varying with the temperature.

One well known air washer is said to use up 30 quarts of water in a day's work under ordinary summer temperatures. Not all of the air washers are as bad as that, but when they have to be refilled a couple of times a day, it becomes somewhat of a chore and often an inconvenience. This fact and the susceptibility to freezing in cold weather form two of the main objections of an air washer.

Figs. 5 and 6 are two forms of air washer now in use. No. 5 has the objection besides those already mentioned, that it employs a floating member with a large bearing surface exposed to the wearing action of the dust entering the cleaner. This surface is in the direct path of the dust which must effect some wear if not actual clogging of the bearing.

No. 6 is a water cleaner which the Wilcox-Bennett Carbureter Co. brought out over a year ago to satisfy certain demands for a wet type cleaner. It contains several novel features designed to eliminate as far as possible some of the objectionable properties of the wet type cleaner. It consists essentially of a centrifugal air cleaner suspended within a cylindrical casing containing a quantity of water. The water is made to revolve within the container by the whirling action of the air drawn into it from the suction of the carbureter. The water rotates because the air is drawn into it tangentially through two spiral tubes in the inner circumference of the casing.

Referring to Fig. 6, the dust-laden air enters at the side as shown and passes into the water compartment through openings in the spirals at *A*. The rapidly whirling air causes the whole mass of water to revolve so that it piles up against the sides in approximately the position shown by the dotted line. This completely submerges the lower ends of the spirals in a heavy spray so that all the air must pass through the water spray before escaping upward into the openings *C* of the inner air cleaner.

Effect of Centrifugal Action

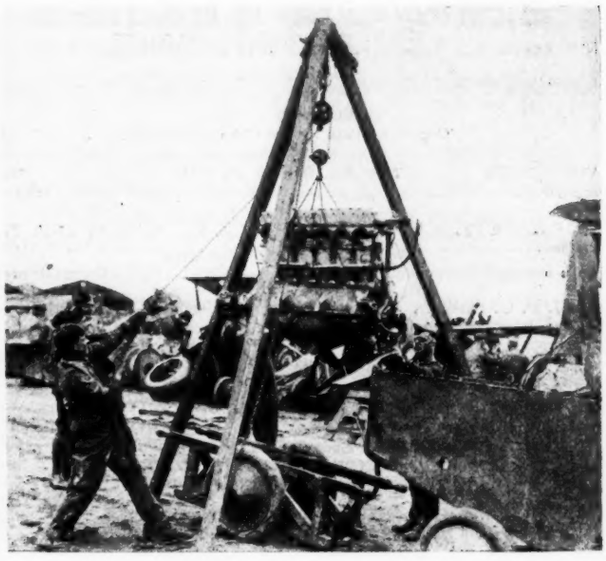
The air cleaner has three spirals on its inner circumference through which the air and entrained moisture pass. The centrifugal action set up in the inner cleaner breaks up any air bubbles, completes the cleaning of the air and also throws down any drops of water that have been picked up in the air. These water drops are thrown downward and back into the water container through the open end of tube *B*. This reduces the humidity of the washed air and also prevents excessive water consumption. The clean air after passing out of the spirals in the inner cleaner escapes upward and out through the elbow at top to the carbureter air intake.

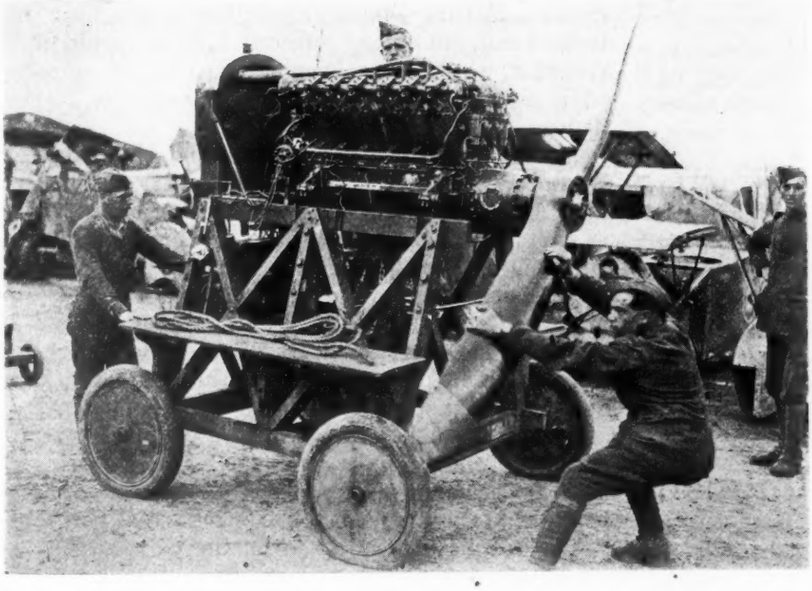
As long as there is any water in the container, the whirling of the water keeps the end of tube *B*, which is very close to the bottom of the container, sufficiently open for the thrown-down water to re-enter the reservoir. However, if the water supply is allowed to totally evaporate, enough mud and dirt will settle under the open end of *B* to seal it, so that even if the container runs dry, the inner air cleaner will collect the dust as a dry air cleaner. If the water container is dry and also clean, no such cleaning action is possible unless opening *B* is closed. Under normal summer temperatures one filling of water should last a full day's run with a tractor in the field.

The reservoir holds about 1 gal., which is a very low water consumption. The air contains so little moisture that it does not interfere with the carbureter action on gasoline as is the case with some other water cleaners. The whirling action of the water in the reservoir creates a heavy spray over the openings of the spirals so that all the air must pass through the water spray instead of bubbling through a volume of water. This practically eliminates the formation of bubbles, thereby increasing the efficiency. Furthermore, any particles

(*Continued on page* 696)

Salvaging Damaged Planes in France





THESE illustrations show one of the many airplane hospitals that have been placed in operation in France. Here, planes that have been damaged in combat and in training are virtually rebuilt, the engines overhauled and the whole machine put in condition for another go at the Huns.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

PUBLISHED WEEKLY
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VOL. XXXIX Thursday, October 17, 1918 No. 16

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Owned by United Publishers Corporation, Address 243 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; W. H. Taylor, Treasurer; A. C. Pearson, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of the Audit Bureau of Circulations.

Automotive Industries-The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

Effects of Tractor Curtailment

THE views of the small tractor manufacturers are quite at variance with those of the large and long-established makers with regard to the War Industries Board curtailment of 25 per cent on the amount of steel and pig iron for 1919 production. Most of the large makers were pretty well stocked up with inventory on Oct. 1, 1918, which they will be permitted to use during 1919, and so the curtailment order does not affect them seriously. The small maker has not been so fortunate.

The situation of many of the smaller and newer concerns in the industry is a difficult one. Take, for instance, the case of a concern that has been preparing to place an assembled or partly assembled tractor on the market and has just reached the point where production is about to begin; it may have a large erecting plant, but, being equipped with only few machine tools, the latter is not suited for any kind of munitions work. If no material for regular production were delivered to such a concern before Oct. 1, 1918, it seems that under the curtailment ruling it will not get any, because, as one manufacturer puts it, "75 per cent of nothing is nothing." Apparently the only thing for such a concern to do is to shut up shop and wait for better times.

In spite of such hardships in individual cases the steel curtailment may prove a partial blessing in disguise to the tractor industry, and some large tractor makers admit this. For some time past there has been a headlong rush into the tractor industry. One reason for this is that during the past year there has been a very pressing demand for farm tractors, and, besides, since the division of industries into an essential and an unessential class, the field for the company promoter has been greatly restricted.

Production Might Have Outstripped Demand

Not only have many new companies been formed during the past year to manufacture tractors, but existing companies in many cases have enormously increased their production facilities. Under these conditions, if the development had been allowed to proceed unchecked, it is a question whether production would not soon have outstripped the demand and a serious slump set in. It is true enough that we are only beginning to introduce tractors on the farm, and that whatever number might have been turned out next year without any Government restriction would have been a small figure compared with the number that will be sold annually 10 years hence.

But it must also be remembered that the farm tractor is still in a relatively early stage of its engineering development. There are a certain number of farmers who, on account of mechanical intuition, enthusiasm for power farming, and perhaps the urgent necessity of doing their work with fewer men, will make a success of the average present-day tractor. However, it does not require a very long conversation with farmers on the subject to bring out the fact that many of them harbor a deep-rooted antagonism to the tractor. Before these more conservative ones can be converted and brought into line as tractor purchasers the tractor must be brought to a higher degree of mechanical perfection.

The restrictions imposed by the Government will give engineers and inventors opportunity to further improve their designs, and at the same time will prevent flooding the market with tractors of immature design. Commercial and engineering development must go hand in hand.

Use American Designs

WITHOUT exception, whenever we have tried to use a foreign design of tractor, airplane engine or what-not we have run into difficulties in the shop. The Sunbeam engine, the Gnome engine, various types of tractors that can not be mentioned for military reasons, are not the only examples of this.

The difficulty starts in the engineering department, where it is necessary for American draftsmen to remake European drawings so that they can

be interpreted by American workmen accustomed to American practice.

The same trouble is encountered in the tool design department, where it is necessary to adapt American tools to foreign practice, and lastly in the shop, where the dimensions given in inches and decimals, as interpreted from the metric system, hit in is his tenderest spot the workman who is used to the inch and fraction system.

Why has the Liberty engine been put into production faster than any other type since this country started to build airplane engines? Simply because it has been designed from the ground up as an American product, adapted to American machinery, and made from drawings which can be interpreted by American workmen.

After all the bitter experiences which our factories have had with work of this nature, it is folly not to read the lesson clearly.

We can make use of the knowledge incorporated in foreign designs by adapting ideas instead of dimensions. By doing this we can carry practice further in advance than is possible by a slavish copy of a foreign design which is bound to be a makeshift in the end, if it ever has the good fortune to reach the production stage.

We have had to throw up our hands on foreign designs before and we are struggling with others now on which we should have been in production if we had started at the beginning with a design adapted to our national manufacturing peculiarities.

We are fully able to stand on our own feet from a design standpoint. We have shown this in the past and it should be our policy in the future.

Establishing An Airplane Industry

THESE are days to lay deep the foundation for the American airplane industry rather than to constantly keep that group of factories now making planes on the rack for lack of contracts and the entire plane industry at 40 per cent of capacity when it should be working at 100 per cent capacity.

There is no question regarding the future of the airplane industry. It is going to be as essential as the motor truck or the farm tractor or the automobile.

To-day our policy regarding building planes and the attitude of certain governmental organizations toward our factories would not indicate that we should be laying strong and permanent foundation stones for a future great industry.

European belligerents have for some months taken definite steps in surveying the future possibilities of the airplane industry and have laid down certain basic plans for its practical working.

Already plans embrace the use of dirigibles for express service between Europe and the Americas, as well as for service to Asia and Africa. Plans also include using the large bombing types of planes for mail service.

Mail and Express Airplanes Necessary

The value of such mail and express service lies largely in the measure of usefulness of mail and express in foreign trade business and in the necessity for such service in inter-colonial trade with such a nation as Great Britain.

Herein lies one of the strong cornerstones of the airplane industry as an essential in the peace and industrial program of a nation. Those people who look upon the bombing plane and the dirigible as only vehicles of war have failed in the comprehensive grasp of the constantly changing conditions which the hour demands.

The day is past when a round-trip mail service with Argentina covering over 6 weeks will serve to maintain necessary trade relationships. The airplane mail of one-third to one-quarter that time must come. It is just as much a certainty as the end of the war.

The point of view of foreign trade by thousands of American manufacturers must be corrected. Those who look upon foreign trade as a business convenience by which a surplus of merchandise can be disposed of when supply exceeds the domestic demand must bury that idea with the Hohenzollern dynasty.

Foreign trade stands as a prime essential of national greatness and national permanency.

We must have foreign trade to secure our necessary share of the raw materials of the world that are not found on this continent.

Our gold is not sufficient surety to obtain such supplies. They can only be obtained through our foreign trade. Foreign trade at once takes on that stature which many leading European nations have attributed to it, and hand in hand with it must come air transportation.

Foreign Trade Requires Air Transportation

Because of this, the foundation and the permanency of our airplane program becomes one of uppermost importance and it seems unfortunate that at present the industry is being stifled rather than developed as it merits. The 40 per cent production stage should cease. A 100 per cent production régime should come in.

We must establish ourselves in the heavy plane industry—that is planes capable of carrying loads of 2 tons or more. That is the big future of the industry. The single-man chasse types of to-day will be of little value in commerce. The two-man planes of to-day will be of little value, but the big bombers and the bigger bombers yet to be, will be the ones that will work for national greatness.

They are the types that will accomplish most in ending the war and the ones that when peace comes will have an immediate commercial value and will admit of quick conversion from a vehicle of war into a necessary vehicle of commerce.

□ Latest News of the

Implement Dealers Losing Tractor Sales

National Federation of Implement Dealers Takes Up Future of Farm Tractor Business—Tractor Is Not an "Implement" —Must Be Sold and Handled as Automobiles

CHICAGO, Oct. 11—"What will the National Federation, which represents the old line implement dealers, do to induce retail implement dealers to maintain themselves in the implement trade by dominating the tractor and power machinery business?"

This subject was the major one up for consideration at the joint meeting here to-day of the sales managers of the old line implement manufacturers and the National Federation of Implement Dealers' Association, representing 16,000 implement dealers who are supposed to sell 75 per cent of the tractors and farm machinery in the agricultural area. It is only once a year that these two organizations meet in joint session, and generally the subject of greatest importance is selected for discussion, and speakers representing both the manufacturers and the dealers are chosen.

This subject was selected this year because of the great number of automobile distributers and dealers who are selling farm tractors and who are also selling power machinery, by which is meant plows and other farm machinery, especially designed to go with tractors as opposed to corresponding machinery designed to be drawn by horses. The meeting was especially significant because many of the old implement dealers who have not taken on automobile lines have been losing that portion of their implement trade which goes with the farm tractor.

The sentiment was general that unless the implement dealer dominates in the selling of tractors and power machinery he will be wiped out. This view was expressed by P. B. Laurie, sales manager of the John Deere Plow Co., who was selected to present the viewpoint of the manufacturers of farm equipment. Mr. Laurie said:

> Unless the National Federation finds a way to induce the retail implement dealers of the country to take on tractors and power farm machinery and to handle them in the right way, then the retail implement dealers who sell only horse-drawn equipment are doomed to extinction. Many retail implement dealers all over the country will not go into the tractor business, and thus the *selling of tractors and power farm equipment is getting into other hands.*
>
> The dealer who sells tractors will sell also a large proportion of the power equipment as well. With tractors and power equipment in the hands of motor car dealers and others so much of the good and profitable trade will have been taken away from the horse-drawn equipment dealer that *he will be forced out of business.*
>
> It may be interesting in this connection to know the results of a recent investigation undertaken by my company—the John Deere Plow Co.—among our dealers. We found that 60 per cent of our implement dealers' agents in the States of Iowa, Illinois and Wisconsin do not handle tractors.
>
> Furthermore, of the 40 per cent who do handle tractors only a portion ordinarily stock tractors and handle them properly. It is interesting to know, too, that of the total number of Deere dealers in these three States only 4 per cent sell the Ford car.
>
> *As manufacturers of farm equipment we call upon the National Federation to do something to stimulate the dealers belonging to the constituent associations to get busy in the tractor business if they do not want to see it go into the hands of motor car dealers. The decision is squarely up to them.*
>
> It is necessary and absolutely vital for the retail implement dealer, if he wants to continue in the trade, to add tractors and power equipment to his present horse-drawn lines. *Also the implement dealer must add the service which goes with the tractor business, and this, gentlemen, will take A-1 dealers. Now what are you going to do?*

The occasion was dramatic and the blunt declaration of Laurie created a sensation. It was the first public and official recognition given to the fact that motor car interests *promise to dominate in the tractor field and precipitate a new alignment in the implement business.*

Coming from the manufacturers of farm operative equipment, with the prominence of the men selected to present the subject, the incident was pregnantly significant.

The viewpoint of the implement dealer was expressed by R. L. Stebbins, a Minnesota member of the dealers' organization, who contended that the tractor business belonged to the implement dealer because he was the logical man to handle it, without giving any very definite reasons for such a stand. His main thought is that the implement dealer knew how to set a plow, how to operate a silo filler, run a threshing machine, or manage a corn sheller. He contended that these were qualifications that made him the proper person to sell a tractor.

The contrary view regarding the qualifications of the implement dealer to handle the tractor was expressed by Mr. Laurie, who declared that the tractor is more like an automobile than an agricultural implement, and that it must be sold and handled as automobiles and motor trucks are. At this point one of the implement agents interjected with "If you want us implement men to handle them," to which Mr. Laurie replied, "Make an agricultural implement out of the tractor, if you will, but if you do, then take hold of it and handle it right."

The meeting was an open recognition on the part of tractor manufacturers that the automotive dealer has demonstrated his ability to handle the tractor, and also care for the service which goes with the tractor and also with farm machinery used with it. The dealer has demonstrated his ability to give that service which keeps the tractor working as a farmer must have it.

The meeting developed the fact that several tractor makers who were also manufacturers of farm machinery have in the past years discovered that the factory cannot give the service, even through its branch house organization, which is necessary, and that it is imperative on the dealer to give this service. The experience of the year has been that the automobile dealer is not only qualified but has the capacity for such a task. It has been admitted by not a few tractor makers that it will require more than two years for the old implement dealer who has not been in the automobile trade to organize himself to give that service which is needed.

Tractor manufacturers have also discovered that the automobile dealer buys tractors in large numbers and stocks them, whereas the implement dealer does not. The automobile dealer also has been in the habit of selling for cash, whereas the implement dealer has favored long credit periods, which has been a serious handicap on his business for many years.

The National Federation of Retail Implement Dealers' Associations in turn is the supreme body in the organized implement retail world. It corresponds to a grand lodge. It is a delegate body meeting but once a year. It is composed of regularly accredited representatives from all the State associations of retail implement dealers throughout the country. The numerical aggregate of retail implement dealers represented by the State associations, and by delegates in the National Federation, is about 16,000, more than half of the recognized retail implement dealers in the United States.

It is claimed, furthermore, that these 16,000 represented dealers sell better than 75 per cent of all the agricultural implements sold in the country. This assertion is based upon the fact that the National Federation represents State associations which are located for the most part in the vast agricultural country lying between the Rocky and the Allegheny mountains. This is the territory which absorbs most of the farm equipment which is made.

These two important and representative bodies, the Sales Managers' Division and the National Federation, meet contemporaneously

(*Continued on page* 696)

Automotive Industries

New Anderson Head Elected

W. C. Anderson Resigns Presidency But Retains Interest —Succeeded by Towsen

DETROIT, Oct. 16—William C. Anderson, for more than 30 years actively engaged in the carriage and electric vehicle industries in Detroit, has retired from the presidency of the Anderson Electric Car Co., which produces the Detroit electric. He will retain his interest with the company and remain in an advisory capacity as chairman of the Board of Directors. He is succeeded as president by M. S. Towsen, who has been head of the Elwell-Parker Co., Cleveland, which produces electric industrial trucks and is closely affiliated with the Anderson company.

Mr. Anderson was the organizer and head of the original Anderson Mfg. Co., which started to produce carriages in Port Huron, Mich., in 1895. Shortly thereafter the company was removed to Detroit and continued as a manufacturer of carriages and electric vehicles. In 1911 the name of the company was changed to Anderson Electric Car Co.

Coincident with the retirement of Mr. Anderson, a number of other changes have been made in the personnel of the company. G. D. Fairgrieve has been elected vice-president and general manager; W. M. Locke, treasurer; W. P. McFarlane, secretary; Wilson Critzer, assistant secretary; George M. Bacon, electrical engineer.

The Board of Directors includes these men with W. C. Anderson as chairman and J. B. Book, William H. Murphy and F. E. Price. Mr. Price, who was formerly advertising manager, hereafter will devote his entire time to the development of the sales division of the industrial truck department in Detroit and vicinities.

The company's two plants in Detroit and Cleveland have been enlarged with increased capacity for passenger cars, trucks and industrial tractors.

—

Rural Express Sells Trucks

New York, Oct. 17—During the past 3½ months, 500 trucks have been sold as a result of the activities of the Highways Transport Committee in pushing Rural Express and Return Loads Bureaus propaganda, according to S. W. Fenn of the N. A. C. C., who told of the work of this organization before the Metropolitan section of the S. A. E. Geo. W. Pride, Regional Director of the committee, was the principal speaker, and he reviewed the work and progress of the body. On Nov. 2 the Metropolitan section will make an inspection trip through the plant of the Wright-Martin Co. at New Brunswick, N. J.

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Two Dozen Companies Get Orders for 25,000 "B" Trucks

WASHINGTON, Oct. 11—Orders have been placed with twenty-four companies for 25,000 class B 3-ton Army trucks as follows:

United Motors Co.	Grand Rapids
Signal Motor Truck Co.	Detroit
Vim Motor Truck Co.	Philadelphia
Winther Motor Truck Co.,	Winthrop Harbor, Ill.
Brockway Motor Truck Co.	Cortland, N. Y.
Denby Motor Truck Co.	Detroit
Lewis Hall Iron Works	Detroit
Republic Motor Truck Co.	Detroit
Bethlehem Motor Truck Co.	Allentown
Diamond-T Motor Truck Co.	Chicago
Rowe Motors Mfg. Co.	Lancaster
J. C. Wilson Co.	Detroit
Sterling Motor Truck Co.	Milwaukee
Indiana Truck Corp.	Marion
Clyde Cars Co.	Clyde
Maccar Co.	Sterling
United States Motor Truck Co.	Cincinnati
Gramm-Bernstein Motor Truck Co.	Lima
Service Motor Truck Co.	Waubash
Standard Motor Truck Co.	Detroit
Atterbury Motor Car Co.	Buffalo
Midland Motor Truck Co.	Oklahoma City
Velie Motor Truck Co.	Moline
Selden Motor Truck Co.	Rochester

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Ford's Pulley Attachment Out in November

DEARBORN, MICH., Oct. 12—Henry Ford & Son are getting ready to start production on the new pulley attachment for the Fordson tractor and deliveries will begin the second week in November. The pulley is going to be marketed without the governor attachment; the demand for the pulley being so great, the company has been induced to get the pulley on the market as early as possible and after exhaustive experiments has found that the pulley will work just as well without the governor.

The total production of tractors to date is 24,000; last week's production was 1028 and the average daily production is 170.

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Stinson Buys Stillwater Plant

MINNEAPOLIS, Oct. 15—The Stinson Tractor Co., yesterday purchased the equipment of the Stillwater Steel & Machinery Co.'s plant at Stillwater, Minn. A factory building in which to place this equipment is now being looked for. The Stillwater concern formerly manufactured the Stinson tractor on contract, but its building was requisitioned by the government.

Seek First Bids on Militors

Motor Vehicle Section of Quartermaster Corps Wants 20,000 —Other Contracts

WASHINGTON, Oct. 16—The Motor Vehicle Section of the Quartermaster Department has requested bids for 20,000 Militor trucks, and it is understood that orders have been placed for some 17,500 other vehicles in addition, these being Nash Quads, F-W-D, Riker, Pierce-Arrow and Garford.

The request for bids for Militors represents the placing of the first order for this new truck. This is a standardized four-wheel-drive vehicle which was first revealed at the recent meeting of the S. A. E. in Dayton. While the order is a large one, it is but natural that contracts should continue to be placed for older types of trucks to stop the gap until Militors can be delivered.

Following are the companies reported to have received contracts from the Motor Vehicle Section:

Nash	7000 Quads
Four-Wheel-Drive	4000 F-W-D
Premier	1000 F-W-D
Mitchel	1000 F-W-D
Kissel	1000 F-W-D
Locomobile	500 3-ton Riker
Pierce-Arrow	2000 1-ton
Garford	1000 2-ton

It is also stated that an order was given the Packard Motor Car Co. for Packard trucks, but the quantity has not been made public.

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Detroit Exports Establish Record

DETROIT, Oct. 14—The biggest month in Detroit's export trade was established during August, when the total exports from this district reached $38,668,564. Of this amount, $24,593,493 represents foodstuffs. The second largest item on the list of exported articles is iron and steel, which totaled $4,371,905. Exports of automobiles and parts amounted to $1,232,887.

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John D. Aitken Influenza Victim

INDIANAPOLIS, Oct. 16—John D. Aitken, who established a record as a racing driver first on National and later on Peugeot cars, died here yesterday of Spanish influenza. He was 32 years old and up to recently had been prominent as a racing driver since the days of the old Vanderbilt cup races. From 1904 till quite recently he was connected with the National company and lately had been doing special work for James Allison and Carl Fisher.

Make Monthly Labor Surveys

Local Community Labor Boards to Report at Request of the War Industries Board

WASHINGTON, Oct. 14—The Community Labor Boards of the Department of Labor, established in each industrial district of the country, will make monthly reports of surveys of the labor conditions in certain industries. These surveys are being undertaken at the request of the War Industries Board for the use of that board and the various branches of the Department of Labor. They include investigations of what are considered the most important and the least important industries of the country.

The United States Employment Service will co-operate with the Community Labor Boards in making these surveys. Following is the list of the manufacturing and mining industries of which the complete surveys will be made monthly:

AGRICULTURAL IMPLEMENTS.
AIRCRAFT.—Aicraft or aircraft supplies and equipment.
AMMUNITION.
AUTOMOTIVE. — Including automobiles, trucks, motorcycles and accessories.
AWNINGS, TENTS AND SAILS.
BAGS.—Hemp, jute and cotton.
BARRELS.
BICYCLES.
BLAST FURNACES.—Producing pig iron.
BOILERS.—Stationary and locomotive.
BOOTS AND SHOES.
BOXES.—Wooden and paper.
BRASS AND COPPER.—Rolling and drawing copper, brass, and other copper alloys in the form of sheets, rods, wire and tubes.
BREWERIES.
CALCULATING AND ADDING MACHINES.
CARRIAGES AND SLEDS.—Children's.
CARRIAGES AND WAGONS.
CARPETS AND RUGS.
CARS.—Rolling stock of every description.
CASH REGISTERS.
CHINAWARE AND POTTERY.
CHAIN.—Iron and steel.
CHEMICALS.—Not mines.
CHEMICALS.—Mines. Sulphur, pyrites and other non-metals.
CIGARS AND TOBACCO.
CLOCKS.
CLOTHING.—All kinds, men's and women's.
COAL MINES.—Excluding anthracite.
COKE.—Including by-products.
CONFECTIONERY.
CORDAGE AND TWINE.—Hemp and jute goods.
COTTON.—Compression of cotton.
CRANES.
DRUGS.—Medicines and medical and surgical supplies.
ELECTRICAL EQUIPMENT. — Plants engaged principally in manufacturing same.
ENGINES.—Steam, gas and water.
FEED.—For live stock and poultry.
FERROALLOYS.
FIREARMS.—Exclusive of United States Government arsenals.
FOODS.—Plants engaged principally in producing food and kindred products for human consumption.
FOUNDRIES.—Manufacture of gray iron and malleable iron castings.
GAS APPLIANCES.
GLASS. — Building, pressed and blown. Bottles and jars.
GLOVES AND MITTENS.
GUNS.—Exclusive of United States arsenals.
HARDWARE.
HATS.
HOUSE FURNISHING GOODS.
JEWELRY.
LAWN MOWERS.
LEATHER GOODS.—Trunks, bags, etc.
LUMBER.
MACHINE TOOLS.
MATCHES.
MATTRESSES.
METALS AND MINERALS (ferro-alloy).—Including mines, smelters, mills and refineries.
MILLS.—Saw and planing, including interior finish.
MINES.—Sulphur, pyrites and other non-metals.
MINING TOOLS AND EQUIPMENT.
NONALCOHOLIC DRINKS.
OIL AND GAS.—Producing and transporting oil or natural gas for fuel.
OIL AND GAS.—Equipment for producing, refining, or transporting oil or gas.
PAINTS AND VARNISHES.
PAPER AND PULP.
PENCILS AND PENS.
PIANOS.
PHOTOGRAPHIC APPARATUS AND SUPPLIES.
PLUMBING SUPPLIES.
POWER AND LIGHTING COMPANIES.
RAILWAYS.—Not operated by United States Railroad Administration.
ROOFING MATERIALS.
SAFES AND VAULTS.
SHIPS. — Not including those built for United States Government, its allies, or United States Shipping Board.
SILVERWARE.
SOAP.
SPORTING GOODS.
STREET RAILWAYS.
STEEL.—Furnaces or mills.
STOVES.—For domestic purposes.
TANNERS.—Plants engaged principally in tanning leather.
TALKING MACHINES.
TEXTILES.—Cotton, woolen and silk.
TEXTILE MACHINERY.
TIN PLATES.
TOOLS.—Small or hand tools for working wood or metal.
TYPEWRITERS.
WATCHES.
WIRE ROPE AND CABLES.

Below is the form which will be used by the Community Labor Board in making out the monthly labor report.

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Urge Abandonment of Meetings

WASHINGTON, Oct. 15—The War Industries Board has requested that because of the Spanish influenza epidemic all meetings scheduled for after Wednesday, Oct. 16, be abandoned. This does not include regular office and inter-departmental meetings, though it is urged that these be held down to as few as possible.

Open Central School for Labor

Chicago Manufacturers Establish Headquarters for Training Unskilled Workers

CHICAGO, Oct. 14—A central school for training unskilled labor has been established in Chicago and will be running within the next week. Local industry is watching the new training school with a great deal of interest because upon its success probably will depend the establishment of a number of others along similar lines. The skilled labor market in Chicago, which for a long time has been a difficult problem, has been made even more serious by the call for highly trained operators in other cities.

In its endeavor to find the exact reasons for the present difficulty in obtaining skilled labor for machine tool work, the Hill Pump Valve Co., manufacturing motor car accessories, conducted an investigation which showed that the labor turnover is exceptionally high, due to the competition among Chicago plants against each other for labor, by which employees were taken from one concern by offers of higher wages from other concerns, both in this city and in other cities.

This investigation showed that in many instances labor was traveling in circles, that many of the workers would jump from factory to factory at the constantly increasing offers of higher wages, and in some cases even coming back within a few years to the original factory, which had weaned them away from their last job.

The idea of a central training school

FORM TO BE USED IN MONTHLY LABOR REPORTS

Industry.....Name of company.....State.....
City.....
Classification of employees

Principal product	Male			Female			Grand total	Number of children under 16 included in total	
.....	White	Colored	Total	White	Colored	Total		Male	Female
Last pay day*.....									
Date.....									
8 months prior to above date.....									
Date.....									

Number of women at last pay day doing work done by men 8 months prior?.....
How many of the employees are common laborers?..... Male?..... Female?....
What percentage of production is on war contracts?**.....
At what percentage of total maximum capacity is plant now operating?***.....
If production is not maximum capacity, state principal cause.....
Remarks.....
Date..... Name.....
..... Address.....

*Take last pay day nearest end of last calendar month.

**The percentage of output on direct Government contracts or subcontracts, or direct contracts or subcontracts with an ally of the United States.

***This should be estimated on the normal operation of the plant, assuming all conditions are favorable for production.

Mail the above report to the BUREAU OF LABOR STATISTICS, 1712 G Street, Washington, D. C.

was placed before the different manufacturing and trade organizations of the city, and also before Chairman Miles of the Section on Industrial Training for the War Emergency Advisory Commission, Council of National Defense, and the co-operation of the Chicago Board of Education was enlisted. Through Assistant Superintendent of Schools Roberts, one of the city's school buildings in the manufacturing district has been designated as a central training school, and Chairman Miles has sent a man from his office to take charge of the school at a salary of $6,000 a year. The Board of Education voted to spend $10,000 for teachers, in addition to donating a school.

Several manufacturers are donating machine tools, such as automatic screw machines, drill presses, etc., duplicates of the machines that they are using in their plants, and upon which employees sent from their factories will perform the same operation that they are to perform when they have finished the course and go back to the factory.

Certain requirements are made of the factories which take advantage of the school. They must, first, furnish certain equipment, that is, machines; second, they must send a certain amount of their green help for training, and third, they must permit their foremen and other skilled workers to give some time to the school as instructors of their help.

It is the understanding that the unskilled workers who are sent from a plant must return to the plant after their course is completed. Night classes are to be established, so that those who are working in the factory in the daytime may take the school course after hours, and thus increase their efficiency and earning capacity. Unskilled help may attend the school without coming from any factory, and it is presumed that such students, if so they may be called, will be free to choose the plant that they will become allied with after the completion of the course.

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Only Salesmen Hit by "Work or Fight" Order

ST. LOUIS, Oct. 14.—No employee of an automobile dealer with the exception of floor salesmen is subject to removal from his or her job under the work or fight order, according to a report filed with President Vesper of the N. A. D. A. by Executive Secretary E. E. Peake. This report was made after Peake and two directors had visited Washington with a view of clearing up the muddled situation as to automobile employees. His report is based upon information obtained from the Provost Marshal's office, whence comes the work or fight order.

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Missouri Has 184,862 Cars

ST. LOUIS, Oct. 14—The Oct. 1 announcement by the Secretary of State shows that Missouri has 184,862 cars licenses to owners. Other figures in the report are: 1648 dealers' licenses, 2340 dealers' duplicate plates, 3692 motorcycle plates, 21,087 chauffeur badges, 8500 re-registrations and 1485 duplicate plates.

Women Suitable for Foundry Work

Rest Periods and 8-Hour Day Needed—Semi-Steel Shells Asked For

MILWAUKEE, WIS., Oct. 12—Two hundred firms connected with the American Foundrymen's Association and other metal industries contributed to the display of manufacturers' products in connection with the annual convention of that association held here this week. The attendance was the largest in the history of the association, which was largely due to the war work being done by the members of the organization. In addition to the American Foundrymen's Association the metals division of the American Institute of Mining Engineers, the American Malleable Castings Association and the iron and steel section of the American Institute of Mining Engineers also met during the convention.

Stress Laid on Gas Shells

Greatest stress was laid upon the manufacture of semi-steel gas and smoke shells, already undertaken in France, and about to be adopted by American manufacturers as a much less expensive but equally efficient product to be furnished the Allied armies. Members of the French technical commission were present to give information concerning the processes used in France, and a report prepared by the committee of American foundry experts acting in an advisory capacity to the Ordnance Department was presented. In this manner the entire foundry industry of America was given the first comprehensive and authoritative instruction with respect to the production of semi-steel shells, which probably will be purchased in enormous quantities by the Government within a short time.

France makes 25,000 of these shells a day. They are not so good as steel shells but are manufactured to keep the factories at a maximum point of operation, as enough steel cannot be used to keep them at maximum on steel shells. France does not want America to cut down her production of steel shells, but if possible to manufacture in addition quantities of semi-steel shells.

33,000,000 Semi-Steel Shells Needed

This country and the Allies are in immediate need of 33,000,000 cast semi-steel shells, and the gray iron and malleable iron foundries of the United States and Canada must become proficient in this work immediately. All sizes of shells will be required. At first the shells will be used as gas shells.

J. A. Galligan of Chicago was of the opinion that there was enough coke to supply western manufacturers for the coming winter, but that the coal supply was doubtful. To-day 52 per cent of the railroad equipment is being used in hauling coal. Approximately 100,000,000 tons more coal will be needed this year than last.

C. E. Knoeppel of New York in an address on employment of women in foundries asserted that more women will have to be secured if the country is to put forth its maximum war effort. In many respects women are more efficient than men in foundry work and can be used for practically every purpose except heavy work. Women should be given the same wages as men. An 8-hr. day should be provided with rest periods. There should be separate entrances for the women, and as far as possible they should be segregated from the men.

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Michigan Labor Shortage Still Critical

DETROIT, Oct. 14—According to a report made by the United States Employment Service the state of Michigan is short 30,000 skilled and unskilled men. Camp Custer is short 2100 unskilled men and 1200 carpenters; Grand Rapids, where a large government picric acid plant is being erected, needs 1200 unskilled men and 400 carpenters; Northern peninsula requires 5000 miners, trammers and laborers and 1500 carpenters. Exclusive of this the state is reported to have a shortage of 20,000 to 25,000 unskilled men and 4000 skilled men. The office reports that the city of Detroit alone needs 1700 unskilled men, 1000 machinists and metal workers, and 1700 other kinds of skilled workers.

During the month of September the office had received calls for 21,707 men and 14,760 were sent to jobs. Of this number 6981 calls were for common labor and 4172 were sent to report for work. Records show that 75 per cent of all the men sent out on jobs are placed. It is difficult to state what becomes of the remainder. It is believed that many of the men and employers fail to send back to the Employment Office the card which is given the applicant to acknowledge the acceptance of the work.

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Ford Employees Raise $20,000 Worth of Foodstuffs

DETROIT, Oct. 14—As a result of a movement started by the Ford Motor Co. employees were successful in raising more than $20,000 worth of foodstuffs on the land which the company offered for this purpose. The land adjoins the plant buildings and has remained unutilized. The area was divided into 401 sections and each employee received 3000 sq. ft. to work.

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Drill Chucks on Export Conservation List

WASHINGTON, Oct. 14—Drill chucks and electrolytic cells have been added to the export conservation list by the War Trade Board, and will require individual licenses for exportation. The restrictions upon the importation of grindstones have been modified by the War Trade Board, which will now allow the importation of grindstones from Europe and Mediterranean Africa when coming as a return cargo, shipped from convenient ports, and when loading can be done without delay.

All Pilots to Carry Oxygen

Aviators in Battle, Reconnaissance and Bombing Planes Hereafter to Have Tanks

WASHINGTON, Oct. 10—Every pilot in the American Army who goes aloft over the German lines in combat or bombing planes will carry oxygen tanks made in the U. S. A., with sufficient oxygen for from 6 to 8 hr. breathing. Pilots and observers in reconnaissance planes on photographic work will also carry them on clear days when such work is carried on at 15,000 ft. or over.

The normal atmosphere near the surface of the earth contains about 21 per cent oxygen and 79 per cent nitrogen. As the pilot ascends, the density of the atmosphere becomes less and the supply of oxygen grows relatively smaller as higher altitudes are reached. At 19,000 ft. the density of the air has diminished to the extent that each cubic foot contains only one-half the amount of oxygen as at sea level.

Pilots who are able to continue for any length of time beyond 10,000 or 12,000 ft. have a sense of "lack of air" and open their mouths in breathing to get more air. The breathing becomes quicker and deeper; the heart beats faster. They obtain the requisite amount of oxygen by increasing the amount of air breathed in a given time and by exposing a greater amount of blood to the oxygen in the air cells of their lungs.

While breathing under this pressure and really in distress, many pilots do not feel any marked inconvenience for a short period before this emergency method of getting air which nature provides gives out. He may feel perfectly fit and well but he is not as efficient as when near the ground. His reaction becomes slower; he uses longer time to judge distance; to aim his guns, to fire, and to manoeuver his plane, although he is not conscious of this impairment. Here disaster lurks, for the pilot with swaying senses is no longer the captain of his plane. He will lose his judgment and if he attempts to stay at these altitudes will gradually pass into a condition of semi and sometimes total unconsciousness. A crash follows.

By the new process oxygen from the tanks carried by pilots flows in such a manner as to in no way impair the comfort or movements of the airman. The apparatus is simple and entirely automatic. While the airplane stands on the ground no oxygen is given off, but when it takes the air the increasing deficiency in the oxygen as the plane arises is automatically made up for by the flow of oxygen without attention from the airman.

The device which does this consists of a small tank, or tanks according to the amount of oxygen carried, the pressure apparatus, and the face mask covering the mouth and nose, and the tube connected with the reservoir. This mask has combined with it the interphone whereby the pilot and observer can talk to each other with ease while in the air.

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British Air Ministry Praises Liberty Engine

WASHINGTON, Oct. 12—The British Air Ministry has officially gone on record in praise of the Liberty airplane engine and the American made De Haviland 9 and De Haviland 10 airplanes. W. C. Potter, Acting Director of Aircraft Production, received a cablegram from the British Air Ministry sent through the British Air Mission in Washington as follows:

"After 100 hours flying, one engine (Liberty) was stripped and found to be in very good condition. Tests have been made in the air in the De Haviland 9-A and De Haviland 10 machines. Engines have performed uniformly satisfactorily in these tests. Information officially expressed 4 months ago to effect that engine would prove satisfactory in service fully confirmed."

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National Aeronautic Committee Meets

WASHINGTON, Oct. 11—The National Advisory Committee for Aeronautics held its annual meeting yesterday at which reports of progress in the scientific study of flight were submitted. These reports were ordered published in the Fourth Annual Report, which will be submitted to Congress in December. The committee reviewed the present aeronautic conditions and situations, and at the same time adopted estimates for continuing further experimental and research work for the following fiscal year. Immediately following the meeting of the full committee, the Executive Committee met and elected Dr. C. D. Walcott chairman of the Executive Committee and Dr. S. W. Stratton secretary of the Executive Committee.

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Four Deaths at Aviation Fields

WASHINGTON, Oct. 12—During the week ending Oct. 5, 1918, there were four fatalities at flying fields in this country due to accidents in training. Each fatality represented 971 hours of flying or 77,680 miles in the air. Following is the summary:

Taliaferro Field, Hicks, Texas	3
Taylor Field, Montgomery, Ala	1
Total	4

There were no deaths reported due to flying training at any of the other 25 fields.

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Oakland Gets Bugatti Cylinder Order

PONTIAC, MICH., Oct. 15—The Oakland Motor Car Co. has been asked to supply the United States Government with cylinders for the Italian Bugatti 16-cylinder engine. Production on this contract is to start next week in the former Northway motor plant.

Living Conditions to Be Examined

Government Commission to Look Into Situation As Means of Increasing Production

WASHINGTON, Oct. 15—The United States Government, through several of its departments, is rapidly becoming a great landlord to tenants occupying buildings erected by Government departments for the use of labor directly engaged in war work. The United States Shipping Board already has 21 housing projects under way, and the Ordnance Department has another 21 in operation. The latter project is operated on a cost plus basis by employers as agents of the Government. All told the Housing Bureau has some 60 projects of various sizes, managed by trained men.

Latterly, conditions outside the plants under which the workers of many of the war industries are living have reached the point where the production program is being seriously interfered with. In consequence the War Labor Policies Board made certain investigations and has recommended the creation of a Commission on Living Conditions of War Workers. This organization will be a branch of the Bureau of Industrial Housing and Transportation.

Its principal purpose will be to eliminate circumstances which in many cases have caused a very large rate of labor turnover with a constant retardation in production. The commission is to investigate living conditions and advise governmental agencies concerning methods conducive to maximum production. The commission will have on its staff specialists in recreation, education, public utilities, safety and sanitation.

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Motorcycle Production Restricted

WASHINGTON, Oct. 16—The manufacture of motorcycles and bicycles has been restricted during the last 4 months of 1918 to 75 per cent of production in the same period during 1917. Such ruling has been made by the Priorities Division of the War Industries Board, which states in Priority Circular No. 37 that makers must reduce their consumption of materials to three-fourths of four-twelfths of the quantity used last year in the same period. Production is not curtailed numerically by specific order. Both the Hendee Mfg. Co., Springfield, and the Harley-Davidson Co., Milwaukee, the two largest manufacturers, are engaged largely on Government work.

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Watson Heads Hispano-Suiza Section

WASHINGTON, Oct. 14—John W. Watson, president of the American Bronze Corp., Berwyn, Pa., has been appointed assistant chief of the Hispano-Suiza engine section of the Aircraft Production Board, of which B. D. Gray is chief. Mr. Watson will make his headquarters in New York.

Imports Into South Africa

863 Cars in Last Six Months —Two-Thirds Less Than Year Ago

JOHANNESBURG, SOUTH AFRICA, Aug. 14—In the first 6 months of 1918 there were imported into South Africa 863 automobiles as compared with a corresponding 6 months of 1917, when 2529 automobiles were imported. This dropping off of imports was entirely due to lack of shipping facilities. The 863 automobiles imported the first 6 months of this year were valued at $615,155, an average of $712.

The importation of trucks showed a falling off also. In the first 6 months of 1918 there were only fourteen trucks imported as compared with eighteen in the first 6 months a year ago. The fourteen imported this year had a total value of $41,765, or an average of $3,000 each.

The importation of tires during the first 6 months of this year showed a small falling off as compared with a year ago. The tire imports this year totaled $865,640, as compared with $992,415 a year ago.

The value of automobile parts imported for the first 6 months of this year was $452,685, as compared with $524,875 in the corresponding 6 months of a year ago.

Although the importation of automobiles showed a heavy falling off in the first 6 months, the custom authorities say that a large number were imported in July, although figures have not yet been given out. One ship has just come to hand with 300 Maxwells, and it may be these belated July shipments will considerably improve the import figures covering the first 6 months of the year.

At present there are four main ports into which automobiles are imported, and of these Port Elizabeth stands first, with Durban second, Cape Town third and East London fourth. The figures showing the number of cars imported at these ports are as follows:

Port	Cars	Trucks
Port Elizabeth	359	3
Durban	257	0
Cape Town	122	2
E. London	112	9
Other Ports	13	0

Car prices increase with every few shipments. It was mentioned in error in a previous article published in AUTOMOTIVE INDUSTRIES that the Ford price was $1,575. It is only $1,250 for the regular model.

A few years ago Cape Town was the port for inland automobile traffic. Now most of the cars pass through Durban and Port Elizabeth. Durban is 500 miles from Johannesburg, Cape Town 1000 and Port Elizabeth 750. But it is found that upward of 10 days are saved by off-loading at Port Elizabeth.

This is chiefly because Durban is fast becoming the general port for the Union, and the railroads and docks are not up to the traffic. So wise dealers get their cars off at Port Elizabeth. Also at Port Elizabeth ships are not off-loaded by the South African railways and harbors—the Government Service—but by a company contract, and they seem to get through the off-loading better.

Durban is now the port for the interior and a fast rising city.

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Liberty Engine Production Totals 10,151 to Oct. 10

DETROIT, Oct. 15—The total production of Liberty engines on Oct. 10, including all makers, was 10,151, these being distributed among the various makers as follows:

Lincoln	2,824
Packard	3,965
Ford	2,010
General Motors	1,144
Nordyke & Marmon	208
Total	10,151

The number of engines shipped by these various companies is slightly lower than the total production figures. This is due to the fact that a certain proportion of engines may be practically 99 per cent assembled but held up for some minor detail. Such details may be completed on a large number of engines in one day, thus pushing daily shipments considerably higher. Following are the numbers of engines shipped from the various plants:

Packard	3,696
Lincoln	2,601
Ford	1,766
General Motors	961
Nordyke & Marmon	139

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Russell Profits $628,581

TORONTO, ONT., Oct. 15—During the fiscal year ending July 31 the Russell Motor Car Co. made net profits of $628,581.55, and though this is approximately $15,000 less than for the previous year, it includes allowances for war profits tax and other contingencies. The balance carried forward shows a marked increase from a year ago, the amount being $536,162.22 as compared with $47,580.67. Following is the balance sheet:

Assets

Cash on hand and in bank	$175,461.55
Accounts and bills receivable	313,830.19
Investments in other companies	3,793,387.47
Dominion of Canada War Loan	321,947.25
Stock on hand, manufactured and in process, raw materials and supplies	137,084.91
Insurance, fuel, etc	7,881.55
Real estate and buildings	54,583.25
Machinery, tools, patterns, furniture, etc.	192,666.61
Less depreciation	25,699.24
Total	$4,871,143.54

Liabilities

Bankers' advances	$325,000.00
Accounts and bills payable (including war tax)	1,014,600.93
Dividends declared and unpaid	77,000.00
Contingent account	216,075.50
Plant investment and insurance reserve	802,304.89
Capital stock (preferred, $1,200,000; common, $800,000)	2,000,000.00
Profit and Loss account	536,162.22
Total	$4,871,143.54

Clear Convoy Routes of Snow

Highways Transport Committee Prepares Plan to Keep Roads Open

WASHINGTON, Oct. 12—The Highways Transport Committee, Council of National Defense, of which Roy D. Chapin is chairman, is preparing plans for the removal of snow from motor convoy routes extending from the north and middle western states to the seaboard during the coming winter.

The committee, which was effective in this work last winter, will use its complete organization, comprising the regional directors and the State Highways Transport Committees, in co-operation with the Motor Transport Corps under General C. B. Drake, in this work.

The State Highway officials of Pennsylvania, New York, Ohio, Illinois, Indiana, Michigan, New Jersey, Massachusetts, Connecticut, Delaware and Maryland, which co-operated with the committee and the War Department most effectively last winter, will be called upon again to arrange plans for the snow removal program which is now contemplated.

The New York Legislature has provided Highways Commissioner Edward Duffy of that state with a fund of $50,000 to be used in keeping the roads traveled by Government trucks clear of snow. Arrangements have been made with Prof. Charles F. Marvin, Chief of the Weather Bureau, by the committee, to have forecasts made from different observation points in the territory to be covered by motor truck routes at least three days in advance of the starting of the trains. In this way it is expected that the organization will be able to anticipate coming snowfalls and guard against them.

Lieut.-Col. W. D. Uhler of the Motor Transport Corps, in co-operation with the committee, is outlining his plan of motor transportation over three main truck routes, one starting from Chicago, one from Detroit and one from Buffalo, and all converging at Baltimore.

Colonel Uhler is also making plans through the use of the army for removal of snow in co-operation with the committee and as soon as his plans are completed they will be announced. General Drake, in a letter to the Highways Transport Committee asking for its co-operation in the removal of snow from truck routes, suggested that the route from Chicago to Baltimore be as direct as possible, the one from Alma, Michigan, via Detroit to Baltimore and that from Buffalo via Albany to Baltimore.

The moving of motor trucks under their own power from factory to seaboard has grown until now there are as many as 500 traveling over the highways in a single day in separate convoys, and by the time the winter snows fall these numbers will have increased considerably.

Trade Reconstruction Policies of European Belligerents

U. S. A. Government Report Gives Comprehensive Analysis

WASHINGTON, Oct. 14—The Government has issued its first report on reconstruction work following the war which has been issued through the Bureau of Foreign and Industrial Commerce which contains an analysis of the main tendencies toward reconstruction in the different belligerent countries of Europe. The reconstruction programs in England, France, Italy, Germany and Austria are outlined and an analysis of each given.

This monograph together with the fact that there are certain Washington representatives in Europe studying reconstruction problems suggests that at last Washington has gotten under way its reconstruction program.

In all of these European reconstruction programs the control of raw materials assumes a major place, and already Great Britain and some of the other countries have entered into agreements with their colonies regarding raw materials.

There is a general sentiment as deduced from an analysis of European reconstruction work that the Government control of an essential product may be converted into a valuable political asset and that political contingencies may make it necessary to keep such a product out of the influence of free economic laws.

Among the high spots brought out in the analysis is the suggestion that there seems to be a general fear that the middle man may be eliminated from the economic structures of some countries after the war.

Germany seems to favor a monopoly on the importation of raw materials as a means of mobilizing the purchasing capacity of the country to counteract economic discrimination.

France holds favorably toward monopolies, a policy which she has stood by in the past.

Co-operation in Britain

In Great Britain and Germany two parallel movements in the work for after-war conditions are seen. In each country the government is creating new instruments or overhauling the old in order to be ready to meet the new conditions created by the war, and private organizations in commerce, industry and finance are getting closer together and co-ordinating their efforts so as to present a solid front to the anticipated onslaught of their old rivals.

While the different countries are preparing for post-war conditions Great Britain, which has been a leader in this movement, is not at present attempting to lay down any complete or binding policies regarding the future, but looks upon such as a waste of effort. Her work at present consists in assembling of facts and taking basic steps to improve educational research and promotive organizations so as to contribute to clear thinking on the questions involved.

Such expedients as a Webb-Pomerene Bill, authorizing the combination of exporters for foreign trade purposes, the Federal Reserve Board and national banking system with their wide leeway in foreign trade banking matters, the Federal Board for Vocational Education developing the fundamentals of reconstruction by consideration of general vocational training, and the collections of statistical data and research investigations by the Department of Labor, Department of Agriculture, Bureau of Mines and the Geological Survey of the Department of Interior, the Bureau of Standards and the Bureau of Foreign and Domestic Commerce of the Department of Commerce, the United States Shipping Board, War Trade Board, War Industries Board, the State Department and the United States Tariff Commission, are all a considerable amount of quiet and effective work that will be found decidedly constructive in the formulation of the policies of the United States for after-the-war business. With the co-ordination of the efforts of all these departments under one Government office much will be done toward safeguarding the economic future of this country.

These views expressed in a bulletin on economic reconstruction prepared by the Bureau of Foreign and Domestic Commerce of the Department of Commerce embody the opinions of official Washington on a subject which is receiving not only consideration but considerable action among both our Allies and the Central Powers. In fact, steps are now under way in this country for an enlarged program of economic reconstruction. Walter S. Gifford, Director of the Council of National Defense, is at present investigating and consulting on the subject with British and French authorities in London and Paris. Plans are being considered for the conversion of the Council of National Defense into a vehicle suitable for handling these matters, for making it into a body possibly similar to the Reconstruction Committee of the British Ministry of Munitions.

Many Plans Adopted

Although the tendency to consider economic factors for after the war as retaliatory weapons is now far less pronounced, states the bulletin of the Department of Commerce, than it was during the period of the Paris Economic Conference, every belligerent country of commercial or industrial importance is considering the economic problems that will arise after the conclusion of peace. Many ambitious schemes have been adopted, but these will of course be modified in accordance with the duration and outcome of the war. But there are certain well defined tendencies and some parts of the program of the more important countries which have received official sanction or been adopted by legislation. These should be considered by the United States because although

Some Conclusions

A—Government Control of Industries Will Increase.
B—Government Control of Raw Materials to Follow.
C—Middleman May Be Eliminated in Some Countries.
D—France Is Favorable to Certain Monopolies.
E—Germany Plans Monopolies on Raw Materials.
F—Business Concerns Uniting for Trade After War.
G—European Plan to Reorganize Consular Service.
H—Great Britain Reorganizing System of Technical Education.
I—Three-Year Control of Exports After Peace by England.
J—Working Clause in Patents and Trade Marks Urged.
K—Banking Amalgamation Started in Germany.

many of them are unsuitable or unnecessary for this country they may prejudice its interest in foreign fields.

Government Control to Increase

There seems to be a unanimous opinion that Government control of and participation in trade and industry in all of the belligerent countries will increase. Admissions of the inevitability of this have been made by even the strongest opponents of the governmental control policy. The chief reason and probably the factor which no opposition can combat lies in the fact that the ordinary sources of revenue of each nation will be insufficient to bear the enormous fiscal burdens and THE GOVERNMENTS WILL HAVE TO GO INTO BUSINESS TO PAY FOR THE COST OF THE WAR.

In addition to this important factor are two others developed as a result of the war and which will undoubtedly influence government control seriously. These are:

Economic self-sufficiency.

National control of raw materials and essential products.

Economic self-sufficiency has developed with the war which has proven it a political necessity. Governments must be self-sustaining. National control of raw materials and essential products is another factor developed by the war and is closely related to the problem of self-sustenance. Both Great Britain and Germany are giving much attention to these ideas—England because of the great extent of the natural wealth of its empire and Germany because of the lack of such wealth in its boundaries. The war has developed the fact that control of essential products by a country may convert it into a valuable government asset, and that it must be kept free from the influence of general economic laws of supply and demand and price fluctuation. If such control is found necessary after the war it is almost certain that it will be a government control; and if the control produces increased profit, opinions, according to the Department of Commerce, are that the Government should receive at least a good share of such profits to be applied to the obligations created by the war and for the promotion of the many plans for social betterment.

The entry of the United States into the war and the Russian revolution are considered as disturbing elements in the original plans for economic pact of retaliation on the part of the Allies and the economic alliance of the Central Powers. An economic union between Germany and Austria-Hungary, however, is regarded as a certainty by economists in both countries, although considerable opposition has developed on the part of commercial interests in the Baltic ports and Hamburg as well as by the Agrarians in Bavaria.

Governments Enter Commerce

Both Germany and Great Britain have established new departments of commerce, the Ministry of Reconstruction in Great Britain and a similar department in Germany, which forecast ambitious plans for after-war world trade. Plans for the reorganization of the consular service and technical education in Great Britain, waterways extension in France, Germany and Austria-Hungary, reorganization of credit institutions in Great Britain and France and the restoration of the merchant marine are movements that forecast these schemes.

German economic life has probably changed more than that of any other country. This is due to the great government control exercised during the war, the intensive paternalism developed by the war and the economic pressure caused by the blockade of that country's boundaries. As a result the German problem resolves itself into two phases:

a—Government control during the emergency period, primarily for economic reasons.

b—Permanent government control, primarily for fiscal reasons.

Germany cannot transform itself suddenly from the present extensive scheme of government control and paternalism into a normal competitive regime without creating serious economic and social complications, particularly in the problems of exchange, shipping and raw materials supplies. Even the commercial interests which have complained bitterly against the German war policy that has eliminated the middlemen admit the need of retaining the present economic organizations in charge of raw materials and foodstuffs for some time after the conclusion of peace, although they urge the abolition of these organizations as soon as possible to allow the restoration of those economic forces which created Germany's economic progress in the past. At present the German economic scheme includes, importantly:

1—Imperial control of cargo space.

2—Imperial control of import rationing and prohibition.

3—Imperial control of foreign credits.

4—Imperial supervision of exports of raw materials and manufactures.

5—Imperial control of the distribution of imports to equalize industrial reconstruction.

In a recent statement before the Reichstag the Secretary of State for Economics stated that so long as the supply of raw materials after the war will be inadequate, the government will have to retain control for the protection of the weaker interests. He stated also that he was taking the threat of an economic boycott on the part of the Allies seriously and making preparations to meet such an emergency. Later in the spring of 1918 the German Government stated that while it does not intend to regulate all commerce and industry it will interfere in the supplies of rubber, oils, leather and hides and such commodities as may be inadequate to meet the demands. In other commodities where there will be a considerable surplus the state will interfere to prevent excessive imports. Present plans include the creation of a number of economic offices to co-operate with the present war companies which will be reorganized on a peace basis. Various trades and industries will be represented by individuals to be nominated by the industrial, commercial and labor organizations subject to the approval of the Secretary of State for Economics. For some time after the war it is expected that German tonnage will be reserved principally for essential imports which will be controlled by an expert commissioner from the Ministry of Economics. Plans also call for government control of freight rates.

Britain to Control Exports

British activities indicating government control for after the war include the introduction of an Imports and Exports Bill providing temporary control for 3 years after the conclusion of peace and a recently adopted Non-ferrous Metal Industry Act giving the Board of Trade control of the business in non-ferrous metals and ores. This last measure is intended primarily to eliminate enemy interests, but is also considered a movement toward government control. At the last meeting of the British Associated Chamber of Commerce it was stated by Sir Albert Stanley that at the close of the war practically all trade and industry of the country will be controlled directly or indirectly, and that it will be the function of the government to immediately abandon these controls as soon as it will be compatible with the national interests. He does not believe, however, that it will be possible for the government to give up its interests in the railways and canals and allow them to revert to their pre-war state.

Continuation for at least 12 months of the existing prohibitions against enemy imports and for government control of exports of essential raw materials is advocated by the Committee on Commercial and Industrial Policy After the War. The London Chamber of Commerce has on several occasions warned against "perpetuation of those methods of expediency justified by the war for after the war." There is a fear that the middleman will be eliminated from the economic structure of the country, a possibility that has considerable opposition.

Organized labor in Great Britain favors government control, a natural attitude in view of the results to labor. At a recent meeting the Labor Party demanded immediate nationalization of railways, mines, production of electrical power and a continuation of the existing government control of commerce and industry for after the war.

Germany to Have Monopolies

The establishment of monopolies as the best practical method of exercising government control is advocated by economists in each of the different countries. Some economists prefer monopolies as against capital levies. There is a German tendency toward monopoly of the import of raw materials as a method of mobilizing the purchasing power of the country to counteract economic discrimination and also as a means of increasing the revenue by depressing the

purchase price abroad and raising the selling price at home. It is also claimed that this form of monopoly would only affect import trade and leave the internal trade undisturbed.

Monopolies in France are established government institutions. This country has long had monopolies of manufacture and sale of some commodities. A monopoly of petroleum is now being suggested embodying the taking over of the existing highly concentrated import trade and refining industry. The British monopoly of petroleum is also being considered in connection with a possible exploitation of the Persian oil fields.

Britain to Control Resources

To secure economic self-sufficiency and national control of essential products the Dominions Royal Commission of Great Britain is investigating the development of the resources of the empire and the prevention of foreign control of such resources. Some sort of department will be established to secure the information of the requirements of the empire in essential products and their actual and potential outputs. An example of the plans of the British Government for the control of national resources is displayed by the recent agreement with the Australian Government by which the output of zinc concentrates will be controlled for the period of the war and 10 years following. The British Government takes the stock of zinc concentrates on hand Dec. 31, 1917, leaving a specified percentage reserve and 250,000 tons yearly for the duration of the war and one year following, and 300,000 tons annually for the succeeding 9 years. It also retains an option on the balance of production, subject to reservations such as the requirements of the Australian zinc refining works and the fulfillment of existing contracts. There is also a tendency in Great Britain for at least a temporary protective policy over certain industries, calculated to shut off imports of specific German products such as magnetos.

France will be busy for years after the war with the restoration of the invaded districts, and realizes that it will not be able to engage in comprehensive plans of economic reconstruction. Consideration is being given to the development of water power resources, coal and colonial activities, and it is likely that agriculture will be stimulated.

Great Britain's Policies

Briefly summarized the British Government in order to meet the problems following the conclusion of peace has developed the reorganization of the War Trade Board corresponding to the Department of Commerce of the United States; the British Ministry of Reconstruction to continue for 2 years after the war, designed to co-ordinate all the departments bearing on reconstruction and which is divided into branches dealing with commerce, production, material supplies, finance, shipping, labor, rural development, health, education, housing and internal transportation; patent and trade-mark legislation; technical education and the Registration of Business Names Act. The Ministry of Reconstruction is assisted by an advisory council representative of all the leading interests concerned in reconstruction. The section of the advisory council working with the branch dealing with finance, shipping and common services is at this time engaged on the problem of the disposal of government stores after the war. This problem is regarded as so important that a special body will be created to take charge of the work and act as a selling organization for the government departments having surplus stocks to dispose of. Army demobilization is being considered and plans are now being formulated.

Rubber Imports Still Decline

Total for 9 Months Below That of Last Year—All Free Rubber Now Received

NEW YORK, Oct. 11—Imports of crude rubber continue to decline. The total to date from the first of the year is less than for the same period in 1917. During the first 9 months of 1917 the total importations touched 136,325 tons, whereas during the first nine months of 1918 the total was 131,132 tons, which is a loss of 5193 tons.

Imports during September were less than half those for August, 5151 tons coming in during September as compared with 10,421 tons in August; this is a drop of 5270 tons. Imports during September, 1918, were considerably less than one-third the tonnage that came in during September, 1917, a comparison of these two months showing a loss of 8513 tons.

Practically the entire amount of September importations is allocated rubber, substantially all of the free rubber shipped prior to May 8, 1918, having reached this country. According to the rulings of the War Industries Board, importations of rubber have been restricted to 25,000 tons during the last quarter of the year, which means that the monthly allowance is approximately 8300 tons. September, of course, dropped considerably below this figure, so that the difference between the actual imports and the allowance will be permitted to come in during October. It is understood that there is quite a quantity of rubber on the seas and that imports will practically equal the quantity permitted to come in.

Following are the statistics as compiled by the Rubber Association of America:

Month	1917, Tons	1918, Tons
January	12,788	16,084
February	10,162	13,108
March	18,624	17,161
April	13,000	12,703
May	18,411	16,288
June	15,096	24,124
July	17,290	16,092
August	17,290	10,421
September	13,664	5,151
Totals	136,325	131,132

The Board of Trade has introduced two measures providing for strict application of the working clause in patent and trade-mark legislation, for greater facilities for licensing and for revocation of patents when patent rights are abused as, for example, failure to work the patent, to grant licenses on reasonable terms or unfair conditions imposed on the sale or use of the patented article. The regulations are intended to prevent the abuse of words as trade-marks and to provide facilities for the registration of marks which could not be registered under past legislation. The Registration of Business Names Act compels the registration of real names, surnames, nationality, nationality of origin, usual residence and other business occupations of the directories of all companies registered in Great Britain or with an established place of business in the country.

Britain's Technical Education

Technical education is to be promoted and is receiving the consideration of a number of committees. Five million dollars has been obtained from Parliament which is to be expended for this work. Private efforts in Great Britain include banking amalgamation, industrial amalgamations, such as the organization of the United Steel Companies, comprising six concerns and capitalized at $50,000,000; the British Trade Corp., which will supply extraordinary credit to concerns that are members and to colonial concerns allied with it; the Federation of British Industries, an association of British manufacturers, which assists the government in framing industrial legislation, settling labor difficulties and the promotion of British trade interests; the British Empire Producers Organization, designed to create economic self-sufficiency for the British Empire; the British-Italian Corp. for the promotion of closer trade relations between the two countries.

In France the Association Nationale d'Expansion Economique has undertaken a comprehensive economic survey of the country, and the Comite Republican du Commerce, de l'Industrie et de l'Agriculture has investigated organizations and published the results, expressing their views in regard to the changes in economic structure necessitated by the war together with preparations for the future.

The Imperial Ministry of Economics created in Germany is divided into two main sections, one dealing with war economics, tariffs, monopolies, syndicates, etc., and the other with such social questions as unemployment, insurance, savings, housing, etc. Bank amalgamation has also taken place in Germany. An export trade organization somewhat like the British Trade Corp. has been capitalized at 25,000,000 marks and will undertake the construction and operation of railroads, harbors, electric plants, factories, etc. There is also a movement for the establishment of a special bank for export trade to insure that small German concerns will receive acceptance credits in the countries now at war with Germany.

Tax on Car Owners Cut 50%

Senate Committee Halves Original Figure—Consider "Gas" Tax Effect

WASHINGTON, Oct. 12—The Senate Finance Committee yesterday reduced the tax on users of automobiles 50 per cent, lowered the tax on sight-seeing automobiles and taxicabs and gave consideration to the possibility of seriously affecting gasoline production through the proposed gasoline tax. New automobile taxes to be put on the users of cars as agreed to by the committee follow:

23 h.p. or less	$5
Between 23 and 30 h.p.	10
Between 30 and 40 h.p.	15
Over 40 h.p.	25

Electric automobiles will pay $2 per horsepower instead of $5, as was fixed by the House, and 25 cents for each 100 lb. of weight instead of 50 cents.

The tax on sight-seeing automobiles was changed from 10 per cent of the gross receipts to a flat tax of $20 per year per vehicle.

The tax on taxicabs and other automobiles operated for hire, carrying not more than seven passengers, was changed from 5 per cent of the gross receipts to a flat tax of $10 per car per year.

The committee also listened to Mark L. Requa, Director of the Oil Division of the Fuel Administration, who told of the shortage of gasoline and the needs for it for war purposes, and urged that special consideration be given to the oil producers in the revenue legislation. At present the revenue bill as passed by the House provides for a tax of 2 cents per gallon of gasoline.

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Chevrolet-General Motors Merger Ratified

NEW YORK, Oct. 14—The merger of the General Motors Corp. and the Chevrolet Motor Co. has been finally ratified, the stockholders voting at a meeting last Friday to adopt the basis of exchange originally laid down. Under this arrangement, holders of Chevrolet stock will receive one and one-seventh shares of General Motors common and 44 cents in cash for each share of Chevrolet. The General Motors Corp. has declared a dividend of $3 per share payable Nov. 1 on common stock of record Oct. 18. Hence, stockholders who prior to that date forward their certificates to the Guaranty Trust Co., New York, properly endorsed, will receive this dividend. Stock delivered after this date will not carry the dividend but holders will receive an equivalent amount from the Guaranty Trust Co. Following is the balance sheet of the Chevrolet Motor Co. as of Oct. 11, 1918:

Assets

Cash	$278,042
732,680 Shares G. M. Common	73,268,000
Total	$73,546,042

Liabilities

Capital stock outstanding, 641,095 shares	$64,109,500
Surplus and undivided profits	9,436,542
Total	$73,546,042

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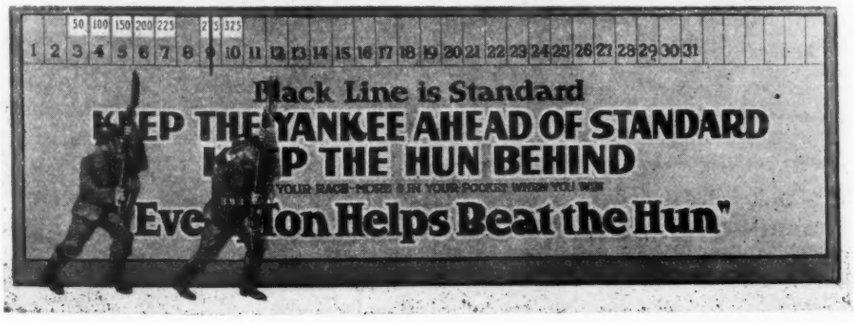
Electric Storage Battery Has Record 6 Months

PHILADELPHIA, Oct. 15—During the first 6 months of 1918 the Electric Storage Battery Co. realized profits only slightly less than the amount realized during the whole of 1917. In 1917 the profits were $2,220,613, as against $2,000,000 for the first 6 months of 1918. The earnings are at the rate of over 26 per cent per annum on a capitalization of $16,130,000. The company is largely engaged on government contracts but is doing work with which it is thoroughly familiar and which has not required extensive plant additions. Following are comparative earnings since Jan. 1, 1910:

Year	Net Earnings	Net Income
1917	$2,220,613	$2,477,882
1916	1,318,796	1,582,053
1915	1,188,618	1,360,748
1914	848,628	1,103,238
1913	1,035,918	1,208,755
1912	1,023,836	1,125,280
1911	1,026,747	3,263,608
1910	871,573	1,120,012



This board has been the means of stimulating production at the forge shop of the Timken-Detroit Axle Co. During August (when the plan was inaugurated) the men aggregated an output 26 per cent in excess of the average production for the previous 6 months. The men know by referring to the board the quota they must meet each day; if they fail to meet it, the figure of the Hun is put ahead of that of the Yank and stays there until the latter regains his ground. The thought to keep the Yank always ahead spurs on the workmen

General Motors Nets $26,078,120

Profits During First Six Months of 1918 at Rate of 10.28% on Common Stock

NEW YORK, Oct. 15—General Motors Corp. for the first 6 months of 1918 showed earnings on common stock at the rate of 10.28 per cent in excess of the 12 per cent dividend now being paid. During that period it realized net profits, after deducting taxes, insurance and depreciation, of $26,078,120. The surplus for the 6 months after paying dividends at the rate of 6 per cent on the preferred stock is equal to 11.14 per cent on the $105,141,700 of outstanding common stock; this is at the rate of 22.28 per cent per year.

Following is the balance sheet as of June 30 compared with the balance sheet as of Dec. 31, 1917:

Assets—	June 30, '18	Dec. 31, '17
Permanent investment	$68,708,687	$38,931,930
Miscellaneous invests.	5,922,688	2,030,274
Cash	31,186,737	18,865,640
Liberty bonds	9,098,123	1,255,009
Notes and accts. receivable	23,975,413	13,595,539
Inventories	56,219,729	46,559,394
Deferred expenses	1,231,360	854,435
Good will	.....	*11,697,503
Total assets	$196,342,737	$133,789,724

Liabilities—	June 30, '18	Dec. 31, '17
Preferred stock	$19,676,800	$19,676,800
Common stock	105,141,700	76,873,300
Outstanding stock sub. cos. not owned by G. M. Corp.	540,500	540,500
Surplus sub. cos.	1,138,558	859,083
Accounts payable	16,032,126	10,665,718
Notes payable	1,100,000	.....
Taxes, pay rolls, etc.	7,287,600	4,858,327
Reserve for two months proportion preferred dividend	190,768	196,768
Reserve for Federal taxes and extraordinary expenditures	15,865,735	6,939,019
Reserve for sundry contingencies	2,657,196	1,671,818
Surplus	26,705,753	11,508,392
Total liabilities	$196,342,737	$133,789,724

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Curtail Electric Heaters

WASHINGTON, Oct. 14—The War Industries Board has ruled that the manufacture of certain electrical heating appliances, including carbureter heaters, hand wheel heaters, intake heaters, manifold heaters, primer heaters, cigar lighters and foot warmers, must be discontinued after Dec. 27, 1918. Prior to that date, manufacturers of such devices will be permitted to match up their stocks and to continue the manufacture of such products as are partly manufactured and to use up stocks of materials on hand. After Dec. 27, however, manufacture of the above mentioned devices must cease absolutely.

James L. White Dies of Influenza

INDIANAPOLIS, Oct. 14—James L. White, assistant general manager and assistant to the president of the Cole Motor Car Co. died suddenly Oct. 10 from Spanish influenza. He had been associated with the Cole organization for many years, going there from the Northway Motor & Manufacturing Co.

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J. E. Baum, of the factory service department, Nash Motors Co., Kenosha, has accepted the position of service manager of the Philadelphia Nash Motors Co. and assumed his new duties in Philadelphia on Oct. 10.

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A. W. Dietzel, for several years superintendent of the Waukesha Motor Co., Waukesha, has resigned to accept the position of works manager of the I. B. Rowell Co., Waukesha, manufacturer of Ford starters, tractor parts and farm implements.

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Donald R. Black, formerly chief draftsman of the L-W-F Engineering Co., is now in the Air Service, U. S. A., having been inducted by his request. He is assigned to Langley Field, Hampton, Va.

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H. L. Hall has been appointed manager of the Chicago branch of the Swinehart Tire & Rubber Co.. The Central Western territory is controlled by this branch.

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E. H. Geyer has been appointed general sales manager of the Hercules Motor & Mfg. Co., Canton, O. He has been associated for a number of years with the Byrne-Kingston Co. and Kokomo Electric Co., Kokomo.

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Charles M. Smith, formerly affiliated with the Detroit Steel Castings Co. and the Michigan Steel Castings Co., Detroit, has been appointed superintendent of the foundry operated by the Nelson Bronze Co., Saginaw, Mich.

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Frank M. Taylor has been appointed efficiency engineer of the Russel Motor Axle Co., Detroit.

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To Make Removable Body Truck

NEW YORK, Oct. 14—A company is in process of formation for the manufacture of a new type of motor truck and removable body with which it is hoped to solve many of the short haul problems of the railroads. The plan, in brief, is to produce wheeled bodies which may be carried intact by the railroads on flat cars and shifted from these cars at the end of the run direct to motor truck chassis. The cars would then be delivered by the motor truck to the consignee, who would draw them off the truck chassis and move them into position for unloading on their own wheels. Both the truck chassis and the bodies are the invention of Jos. C. Bonner, who heads a syndicate which shortly is to be converted into a manufacturing company.

Men of the Industry

Changes in Personnel and Position

Graham Heads "Exiles"

WASHINGTON, Oct. 15—George M. Graham, chairman of the Motor Truck Committee of the N. A. C. C., has been elected president of a new association styled "The Exiles," in which membership is limited to men of the motor car industry who have spent two months or more in Washington since the war began. Other officers are: Vice-president, Alfred Reeves; secretary, Harry W. Perry; Automotive Products Section, War Industries Board.

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Wolverine Tractor Elects Directors

SAGINAW, MICH., Oct. 14—The Wolverine Tractor Co. has elected the following board of directors: W. J. Wickes, Arnold Boutel and W. E. Laur of Saginaw; C. A. Bigelow of Bay City; W. E. Wood, W. G. Wagenhals and W. F. Austin of Detroit. The company has been capitalized for $300,000, of which $175,000 has been subscribed.

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Steel Products Builds Shop Addition

DETROIT, Oct. 14—The Steel Products Co. has taken out a permit for a one-story machine shop addition, 89 by 123, at 2177 East Sixty-fifth Street. The estimated cost of the job is $30,000.

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Grand Rapids Brass Enlarges

GRAND RAPIDS, MICH., Oct. 14—The Grand Rapids Brass Co. will erect at once an addition to its factory of three stories and basement, the building to be completed before Jan. 1.

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Supplies and Accounts Contracts

WASHINGTON, Oct. 12—The Bureau of Supplies and Accounts of the Navy Department has placed contracts as follows:

Ford Motor Co., Detroit, ambulances.
Willys-Overland Co., Toledo, blocks.
Livermore Mills Co., Livermore, N. H., airplane spruce.
Curtiss A. & M. Corp., Buffalo, N. Y., HS-2 shells.

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Bureau of Supplies Orders

WASHINGTON, Oct. 12—The following orders were placed by the Bureau of Supplies and Accounts of the Navy Department:

Jamestown Propeller Co., Jamestown, N. Y., propellers.
Hendeen Mfg. Co., Springfield, motorcycles.
Harley-Davidson Motor Co., Milwaukee, motorcycles.
Federal Motor Truck Co., Detroit, motor trucks.

Fenner Appointed Assistant to Hanch

WASHINGTON, Oct. 10—David C. Fenner, member of the Highways Transport Committee of the New York State Council of Defense, has been appointed as assistant to C. C. Hanch, Chief of the Automotive Products Section of the War Industries Board.

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Albert W. Russell, formerly president of the Russel Motor Axle Co., and treasurer of the Russel Wheel & Foundry Co., Detroit, has been appointed a member of the War Credits Board to fill a vacancy caused by the resignation of F. P. Neal

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E. B. Foote, who has for some time been connected with the sales department of the Jaxon Steel Products Co., Jackson, Mich., has been placed in charge of the newly created wheel division of that company, with headquarters in Detroit, for the marketing of the Jaxon steel wheel.

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Lee Anderson, vice-president and sales manager of the Hupp Motor Car Corp., Detroit, has taken charge of the publicity and advertising work of the Aircraft Production Bureau in Detroit. Newspaper advertisements, a house organ for employees and feature posters are among the means which he will use to stimulate increased production.

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C. E. Morton, formerly Pacific Coast district manager for Packard, has been appointed manager of the Packard overseas division.

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Thomas A. Russell, for 2½ years chief engineer of the Tractor Bearings Division of the Hyatt Roller Bearing Co., Detroit, and J. E. Martin, for 2 years dynamometer expert of the same division, were recently commissioned lieutenants.

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V. C. Fuller has been appointed special traveling representative of the Bearings Service Co., Detroit, with headquarters at the main office.

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Motor Truck Sales Managers to Meet

CLEVELAND, Oct. 14—The first regular meeting of the Association of Sales Managers of the Motor Truck Industry will be held in this city, Oct. 18, for the purpose of electing a board of directors and executive officers. Different points regarding the sale of motor trucks, their use, the possibility of trailers and the importance of good roads will be discussed.

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New International Steel Plant

MILWAUKEE, Oct. 14—The International Steel Products Co., manufacturing gas engine silencers and other accessories and parts of pressed sheet steel, has broken ground for its new and permanent works in Hartford, Wis., the first unit of which will cost about $30,000.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

General Motors to Make Frigerators to Be Marketed by Car Dealers

DETROIT, Oct. 12—W. C. Durant has bought the equipment and the rights of the Guardian Frigerator Co., Detroit, thereby bringing the General Motors Co. into the ranks of general utilities manufacturers. The entire Plant 5 of the Cadillac will be utilized in the manufacture of frigerators. The new company will be styled The Frigidaire Co.

The frigerator is a large insulated box in which food is kept at a low temperature generated and controlled by means of an electric motor.

The Guardian Co. had been in business for 2 years. The inventor of the machine and founder of the company, A. W. Mellows, will retain an interest in the new company. J. W. Murray of the J. W. Murray Manufacturing Co. becomes a stockholder. The officers of the new company have not been elected.

The product manufactured, which is more than a mere ice box or refrigerator, will be marketed through the General Motors dealers and distributers, thus filling in for them to a large degree the gap which has been caused by the reduction of passenger car production.

The frigerators will be sold to dealers on the same basis as cars with a slightly better percentage of profit. There are two models—one sells for $350, the other for $365—and the profit averages 25 per cent. The machines will take up very little space in a dealer's showroom and no accessories need be carried in connection with the proposition.

Within 30 days it is planned to have agencies established in Washington, Atlanta, Buffalo, New York, Pittsburgh, Philadelphia, Cincinnati and Dayton. Before Jan. 1, 1919, every General Motors agency will represent this company.

—

Supreme to Erect Plant

CLEVELAND, Oct. 15—The Supreme Motors Corp., Warren, Ohio, has completed arrangements for the erection and equipment of a plant in which it will produce a complete line of engines. For the present, however, the company will confine its operations to war work. The officers of the company are: President, A. W. Green, Windsor, Ohio; vice-president and general manager, C. H. Davies, Warren, Ohio; secretary, C. F. Erickson, Ashtabula, Ohio; treasurer, C. N. Mitchell, Cleveland.

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More Room for McCord

DETROIT, Oct. 14—The McCord Mfg. Co., has let the general contract on a three-story addition to its factory at Jefferson Avenue and Conners Creek.

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Hospital of Milwaukee Ford Plant

MILWAUKEE, Oct. 14—The Milwaukee assembling plant of the Ford Motor Co., formerly serving the Wisconsin and Upper Michigan territory, has been requisitioned by the Government and will be converted immediately into a hospital of 1000 beds, with full equipment of surgical laboratories, operating rooms, etc. In recent months the plant has been used entirely to supply parts to Ford dealers in this territory, the assembling of cars having been discontinued in March.

—

Zenith Carbureter Enlarges

DETROIT, Oct. 14—The Zenith Carbureter Co. is erecting a new four-story addition, 40 x 64, to its factory at the foot of Hart Avenue. The new building will cost about $75,000. The ground floor will be ready for occupancy after Nov. 1, and the balance after Dec. 1.

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Consolidated Mfg. Co. Operates 80 Per Cent on War Work

TOLEDO, Oct. 12—The Consolidated Mfg. Co. is now about 80 per cent on war work, which consists of tubing, stampings and drop forgings for everything from motorcycle side cars for the Italian government to airplane and ship forgings for the aircraft and shipping boards. The tubing division of the plant is making 100,000 tubular die handles, to be used on work of the Emergency Fleet Corp. The company formerly manufactured motorcycles, but the facilities of this branch of manufacture have been turned to the bicycle industry. The company is averaging 1500 bicycles a week.

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Continental Declares Another Dividend

DETROIT, Oct. 10—The Continental Motors Corp. has declared a dividend of 1½ per cent, payable Oct. 30, to holders of common stock of record Oct. 21. Books of the company will close at the end of business, Oct. 21, and will re-open Oct. 31. The dividend will make a total of 6 per cent the corporation has paid to owners of its common stock during the calendar year. The regular quarterly dividend of 1¾ per cent is payable Oct. 15 to owners of preferred stock of record Oct. 5. It is understood that the plants of the Continental Corporation will be running on a 100 per cent war order basis shortly before Jan. 1. The change from private to government work is being effected on a gradual basis and has been under way for some time past.

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Declare Dividends

Pyrene Mfg. Co., quarterly dividend of 2½ per cent on common.

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Packard Motor Car Co., Detroit, 4 per cent on common, payable Oct. 31 to holders of record, Oct. 15.

Kahlenberg Adds to Buildings

TWO RIVERS, WIS., Oct. 14—The Kahlenberg Bros. Co., Two Rivers, Wis., maker of marine and stationary oil engines, has commenced construction work on a large new assembling, testing and shipping building. The space released by this addition to the facilities will be devoted to manufacturing. The new building will be equipped with a large electric traveling crane and the most modern testing equipment and accessories.

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More Room for Langstadt-Meyer

APPLETON, WIS., Oct. 14—The Langstadt-Meyer Mfg. Co., manufacturer of farm lighting systems and direct-connected generating units for other purposes, is enlarging its capacity by taking over the building heretofore occupied by the Appleton Motor Car Co. as a salesroom, service station and public garage. The entire building will be converted into a machine shop.

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Oneida to Build Trailers

MILWAUKEE, WIS., Oct. 14—The Oneida Motor Truck Co., Green Bay, Wis., is reported to have been granted a large contract to build trailers to be used for mobile army kitchens by the American Expeditionary Forces.

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Kissel Adding a Building

HARTFORD, WIS., Oct. 14—The Kissel Motor Car Co., which is devoting practically its entire facilities to the production of Four Wheel Drive trucks for the Government, has awarded contracts for the erection of a one-story warehouse building, 50 x 260 ft.

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Twenty-five Houses for Foundry Workers

BUCYRUS, OHIO, Oct. 12—The Ohio Steel Foundry and Carroll Foundry & Machine Co. have let a contract to the Bucyrus Builders Co. for the erection of twenty-five moderately priced houses, valued at from $1,800 to $2,000 for employees.

—

Another Extension for Falls

MILWAUKEE, Oct. 14—Another large addition to the plant of the Falls Motors Corp., Sheboygan Falls, Wis., will be erected immediately. It will consist of a one-story shop addition, 120 x 275, and is the fourth extension made within a year's time. The company is devoting 100 per cent of its facilities to the manufacture of engines for Government trucks and other army purposes.

—

Detroit Concerns Expanding

DETROIT, Oct. 12—The Detroit Lubricator Co. has been given a building permit to erect a one-story shipping room, 104 by 120, to cost $25,000.

The Packard Motor Car Co. has obtained a permit for an addition to its plant to cost $30,000.

The American Car & Foundry Co. will build a two-story factory addition, 33 by 120, to cost $20,000.

Tractor Development in Iowa

(*Continued from page* 665)

far has been able to deliver only very few machines owing to inability to get needed machine tools and other equipment. The worm gear used is manufactured for the concern by the Cleveland Worm & Gear Co. This tractor has a 4¼ x 5½ in. four cylinder engine, and the present price is $1,685. Some years ago William Galloway took over the old Maytag automobile plant, which is directly adjacent to its own implement plant, and this is being converted into a tractor factory.

The fourth Iowa manufacturer of farm tractors is the Dart, which has just about completed its development work and is ready to begin production. The Dart has long been known as a manufacturer of motor trucks, having for some years produced a high-wheel motor delivery wagon and more recently heavier trucks of conventional design. The firm owns a manufacturing plant of modest dimensions and will continue the manufacture of trucks. The eastern agency for the new Dart Blue J tractor has been taken over by the Maxim Munitions Corp. and the tractor has been brought prominently to public attention by the activities of this concern. The Dart tractor is the work of W. H. Johnson of the company, who has acted in a consulting capacity to other tractor firms in the past. The machine is of clean-cut design throughout.

Leader Becomes Rex

Des Moines also has its tractor factory in the Leader, which in 1916 took over the business of the Ohio, which was started in 1901 or 1902 and manufactured about 850 all told during its existence. Owing to the use of the name Leader by another tractor company, the Des Moines concern has chosen the name Rex for its new model, which will shortly be put in production. This is a 3-plow, 12-25-hp. tractor, weighing about 5500 lb. and using kerosene as fuel. It is fitted with a Waukesha engine 4¼ by 5¾, equipped with a Kingston carbureter, Eisemann magneto with impulse starter and Perfex radiator. The fuel tank holds 20 gal. of kerosene and 5 gal. of gasoline. S K F ball bearings are used in the gearbox. The engine sets crosswise of the frame and the drive is through spur gears exclusively. A Bierman clutch is used. Two forward speeds are obtained through the sliding type gearset of 2½ and 4 m.p.h. respectively. Sliding pinions on an extension of the clutch shaft mesh with a double gear on the differential shaft, and thence the drive is by bull pinions and gears to the rear wheels. The rear axle, which is 2½ in. in diameter, turns in bearings on the axle housing.

The rear wheels are 60 x 10 in. and the front wheels 46 x 4 in. The front axle is built up and is provided with automobile type steering knuckles. The frame is made of 7-in. 12¼-lb. channels and is very narrow in front where it is pivoted to the front axle, this feature, of course, being designed to permit of turning the tractor in a short radius. Steering is effected through the intermediary of screw and nut steering gear, by means of a nearly horizontal shaft, to the rear end of which is secured the steering hand wheel. It is planned to provide extensions for the steering shaft and also for the other control members, so that the tractor can be operated from the seat of an implement drawn by it, such as a binder.

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Air Cleaners Analyzed and Compared

(*Continued from page* 680)

of water containing dust are thrown out of the air while passing through the inner cleaner and drop back into the water reservoir again. This also accounts for the low water consumption.

Except at the instant of starting, the frictional resistance of this water cleaner is no greater than that of an equivalent one of the dry type because after once started it requires but little force to keep the body of water revolving.

Air Cleaner Types

The fourth type of air cleaner and the most widely used works on the centrifugal or gravity principle. Figs. 7 and 8 are examples of this type of cleaner. Fig. 8 was the first successful centrifugal or gravity cleaner on the market and is used on 75 per cent of the different makes of tractors which use air cleaners. It has been so widely used during the past 3 years as to require little explanation. The air is drawn by the motor suction through the openings in the sides of the cleaner into the spiral tubes. These spiral tubes have a downward pitch which gives the dust laden air a whirl, so that centrifugal action and gravity throws the dust out of the air under the cone and into the container below, while the clean air passes upward through the top and into the carbureter.

Fig. 7 shows a centrifugal cleaner of the same type as Fig. 8, differing only in outward appearance and size. The principle and action are identical and the construction nearly so.

There are several other forms of the four types of cleaner, but the ones shown and described in this paper are representative and serve to show the principles and design involved.

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Electric Dynamometers for Aircraft Engine Tests

(*Continued from page* 677)

neto of the engine in case of tripping of the main circuit breaker, and to this is frequently added an attachment for shorting the engine ignition in the event of overspeed.

For the measurement of speed an indicating tachometer is regularly provided, either of the electric type or of the same type as is used in the airplanes themselves. It is customary also to have a speed counter for accurate measurement of the revolutions.

A recent application of the electric dynamometer is for the making of efficiency and endurance tests on propellers. The dynamometer is used as a driving motor and the propeller is mounted upon a sliding shaft coupled to the dynamometer in such a manner that not only is the torque required to drive the propeller measured, but the thrust or reaction is also indicated. This arrangement is proving of great value in making overspeed tests on propellers.

Electric dynamometer testing of airplane engines is coming into very general use in all of the different departments of the Government in which engine tests are made, and with the leading engine manufacturers.

One of the most noteworthy installations of electric dynamometers is in one of the plants of the Willys-Overland Co., where engines of the training type have been produced. This plant has put over 6000 engines through the electric test and was the first plant in the country to reach a production of fifty airplane engines a day.

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Tractor Makers Protest Curtailment

(*Continued from page* 659)

W. S. Franklin, Jr., secretary Parrett Tractor Co., Chicago, Ill.
R. F. Florian, general manager Square Turn Tractor Co., Norfolk, Neb.
Merritt J. Osborn, general manager Nilson Tractor Co., Minneapolis, Minn.
S. G. Miller, president Belt-Rail Tractor Co., St. Paul, Minn.
H. C. Berry, engineer U. S. Tractor & Machinery Co., Chicago, Ill.
J. B. Foote, president Foote Bros. Gear & Machine Co., Chicago, Ill.
J. C. Westmont, general manager Wisconsin Farm Tractor Co., Sauk City, Wis.
B. J. Larkin, vice-president Brewer Mosel Automobile Co., Madison, Wis.
M. D. Herron, sales director Dart Truck & Tractor Corp., Waterloo, Iowa.
P. Morris, Illinois Tractor Co., Bloomington, Ill.
M. B. Falvey, Kokomo Electric Co., Kokomo, Ind.
A. C. Bennett, Wilcox-Bennett Carbureter Co., Minneapolis, Minn.
D. V. Kennedy, sales engineer Perfex Radiator Co., Racine, Wis.
George D. Bailey, G. D. Bailey Co., Chicago, Ill.
Henry Farrington, Agrimotor, Chicago, Ill.

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Implement Dealers Losing Tractor Sales

(*Continued from page* 684)

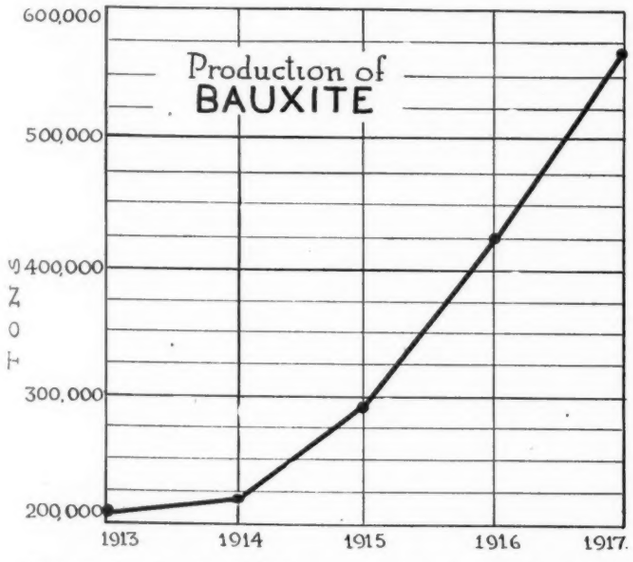
once every year. One session is a joint meeting. Eeach organization sends to the other in advance of the joint conference a list of subjects which it appears desirable to discuss in order that sales managers and dealers may reach accord, if possible, upon trade policies which affect both. This joint conference is highly regarded by both. *What takes place at that conference is likely to make implement history.* There is a frank interchange of opinion. Manufacturers and dealers, through their accredited representatives, meet face to face and let the bars down. *Policies momentous to the implement trade have been determined upon at past conferences; policies equally momentous will be determined at future conferences.*

That was the stage upon which the drama of last week was played.

AUTOMOTIVE MATERIALS MARKETS

Materials Market Prices

Acids:		
Muriatic, lb.	.02	-.03
Phosphoric (85%)	.35	-.39
Sulphuric (60), lb.	.008	
Aluminum:		
Ingot, lb.	.33	
Sheets (18 gage or more), lb.	.40	
Antimony, lb.	.13	-.13¼
Burlap:		
8 oz., yd.	12.4	-15.85
10½ oz., yd.	14.6	-18.6
Copper:		
Elec. lb.	.26	
Lake, lb.	.26	
Fabric, Tire (17¼ oz.):		
Sea Is., combed, lb.	1.65	-1.70
Egypt, combed, lb.	1.25	-1.35
Egypt, carded, lb.	1.20	-1.30
Peelers, combed, lb.	1.05	-1.20
Peelers, carded, lb.	.95	-1.05
Fibre (⅛ in. sheet base), lb.	.50	
Graphite:		
Ceylon, lb.	.07½	-.25
Madagascar, lb.	.10	-.15
Mexican, lb.	.03¾	
Lead, lb.	.08	-.09
Leather:		
Hides, lb.	.18	-.35¼
Nickel, lb.	.40	
Oil:		
Gasoline:		
Auto., gal.	.24½	
68 to 70 gal.	.30½	
Lard:		
Prime City, gal.	2.50	
Ex. No. 1, gal.	1.70	
Linseed, gal.	1.63	-1.65
Menhaden (Brown), gal.	1.30	-1.31
Petroleum (crude),		
Kansas, bbl.	2.25	
Pennsylvania, bbl.	4.00	
Rubber:		
Ceylon:		
First latex pale crepe, lb.	.62	
Brown, crepe, thin, clear, lb.	.56	
Smoked, ribbed sheets, lb.	.61	
Para:		
Up River, fine, lb.	.63½	
Up River, coarse, lb.	.36½	
Island, fine, lb.	.59	
Shellac (orange), lb.	.74	-.75
Spelter	.09¼	-.09¾
Steel:		
Angle beams and channels, lb.	.03	
Automobile sheet (see sp. table).		
Cold rolled, lb.	.06½	
Hot rolled, lb.	.03½	
Tin	.80	
Tungsten, lb.	2.45	-2.50
Waste (cotton), lb.	.12¾	-.17



Bauxite is of value chiefly as a source of metallic aluminum, being first purified by chemical processes, after which the aluminum hydroxide is reduced in an electric furnace

AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

	Primes only Per 100 lbs.	Primes when seconds up to 15 per cent are taken Per 100 lbs.
Automobile body stock	$5.95	$5.85
Automobile body stock, deep stamping	6.20	6.10
Automobile body stock, extra deep stamping	6.45	6.35
Hood, flat fender, door and apron, or splash guard stock	6.05	5.95
Crown fender, cowl and radiator casing, deep stamping	6.30	6.20
Crown fender, cowl and radiator casing, extra deep stamping	6.55	6.45

Automobile Sheet Extras for Extreme Widths:
Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lb.
Nos. 19 and 21 over 36 in. to 44 in., 30c. per 100 lb.
Nos. 22 to 24 over 26 in. to 40 in., 40c. per 100 lb.
Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lb.
Black Sheet Extras to Apply to Narrow Widths:
Oiling, 10c. per 100 lb.
Patent leveling, 25c. per 100 lb.
Resquaring, 5 per cent of gage price after quality, finish and size extras have been added.
Seconds 10 per cent less than the invoice Pittsburgh price for corresponding primes.

Knobloch in Ordnance Department

CLEVELAND, Oct. 14—A. F. Knobloch, vice-president and works manager of the Cleveland Tractor Co., Cleveland, has been appointed assistant to L. J. Horowitz in the Ordnance Department at Washington. In that capacity he will represent Mr. Horowitz in matters having to do with the practical, manufacturing and technical details in providing the fighting tanks required in Europe.

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Wheel Makers Convene

DETROIT, Oct. 16—Representatives of 24 manufacturers of wheels attended the third meeting of the Automotive Wheel Association held here yesterday. How the manufacturers can better assist the Government and efforts to standardize the wheel industry were the principal subjects discussed. The next meeting will be held at Chicago Dec. 9.

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Complete Detroit-Toledo Road

DETROIT, Oct. 16—The last 14 miles of paved highway between Detroit and Toledo were formally opened to traffic yesterday after appropriate dedicatory ceremonies had been held. A Government train of twelve army trucks was the first to traverse the new road, which is the most important link of state highways in Michigan, as it is the gateway to the seaboard. The newly completed section of road was in course of construction since 1915, and from time to time new pieces were added until the entire 14 miles were completed. Eleven miles were built during this year and 3 miles since 1915. The cost of the project was approximately $600,000.

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Federal Withdraws 3½-Ton Model

DETROIT, Oct. 16—The Federal Motor Truck Co. has withdrawn from the commercial market its 3½-ton truck. The move has been necessitated by the heavy demand by the Government for vehicle of this type.

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American Bronze Makes Changes

BERWYN, PA., Oct. 14—The American Bronze Co. has made a number of changes in its organization. Matthew C. Dittman, vice-president and treasurer, has been appointed general manager, and C. H. Baker, formerly auditor of the Timken Roller Bearing Co., Canton, will be his assistant. E. G. Anderson, sales manager, has been appointed advertising manager.

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Curtail Road Making Machinery and Parts

WASHINGTON, Oct. 10—Road making machinery and parts cannot be manufactured in any quantities for the 6 months beginning Oct. 1, 1918, except:

a—Repair parts.

b—For work for railroads and other public utilities.

c—For roads repaired by the United States Government, the several states, counties and municipalities.

d—For new construction by the United States Government either directly or indirectly.

This curtailment is by the order of the War Industries Board. Briefly, it means that no road making machinery will be manufactured for the construction of new highways except where such construction is either directly or indirectly for the Government. Parts for the repair of road making machinery can be secured however, where the machinery is to be used in the repair of roads and highways either for the Government or for state, county or municipal order.

Contracts Placed

WASHINGTON, Oct. 14—The following orders were placed by the Bureau of Aircraft Production:

Wright-Martin Aircraft Corp., New Brunswick, engine spares.
Spranger Wire Wheel Co., Detroit, spares for planes.
Howell & Lesser, San Francisco, Cal., spares for planes.
Budd Wheel Corp., Philadelphia, spares for planes.
Marlin-Rockwell Corp., New York, radiators.
The Acklin Stamping Co., Toledo, Ohio, spares for Handley-Page.
B. F. Goodrich Co., Akron, tires and tubes.
Willys-Overland Co., Toledo, nuts.
Light Mfg. & Foundry Co., Pottstown, Pa., lower crank cases.
Disco Mfg. Co., Detroit, synchronizing generators.
English & Mersick Co., New Haven, radiators.
Doehler Die Casting Co., Toledo, Ohio, engine spares.
Wright-Martin Aircraft Corp., New Brunswick, tools for repairing engines.
Pittsburgh Steel Products Co., Pittsburgh, Pa., seamless steel tubing.
Wire Wheel Corp. of America, Buffalo, wire wheels for planes.
Ericsson Mfg. Co., Buffalo, magneto terminals.
Fitzgerald Mfg. Co., Torrington, Conn., gaskets.
Taylor Instrument Co., Washington, D. C., thermometers.
Taylor Instrument Co., Washington, D. C., barometers.
Curtiss Aeroplane & Motor Corp., Buffalo, cap screws.
Lewis Spring & Axle Co., Chelsea, Mich., spares for planes.
Hayes Ionia Co., Grand Rapids, parts for planes.
Springfield Aircraft Corporation, Springfield, airplanes.
Curtiss Aeroplane & Motor Corp., Buffalo, airplanes.
Bosch Magneto Co., New York, N. Y., magnetos.
Harrison Radiator Corp., Lockport, radiators.
Goodyear Tire & Rubber Co., Akron, streamline wheel covers.
Rome-Turney Radiator Co., Rome, N. Y., radiators.
North East Electric Co., Rochester, voltage regulators.
North East Electric Co., Rochester, N. Y., overland relays.
Corcoran-Victor Co., Cincinnati, Ohio, aero navigation lights.
Curtiss Aeroplane & Motor Corp., Buffalo, bolts and nuts.
John A. Roebling's Sons Co., Trenton, N. J., wire.
St. Louis Aircraft Corp., St. Louis, airplanes.
Joseph N. Smith & Co., Detroit, generator mounts.
Curtiss Aeroplane & Motor Corp., Buffalo, spares for planes.
The Rubay Co., Cleveland, Ohio, spares for planes.
G. & O. Mfg. Co., New Haven, Conn., radiators.
Wright-Martin Aircraft Corp., New Brunswick, wrenches.
Curtiss Aeroplane & Motor Corp., Buffalo, gaskets.
Boston Auto Gauge Co., Boston, Mass., gauges.

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Gas Engine for Indian Office

WASHINGTON, Oct. 14—The United States Indian Office, Department of the Interior, Washington, D. C., requests bids on the following tractors and gasoline tank. Bids must be accompanied with certified checks or drafts for bond equal to 5 per cent of the total amount.

Contracts

One 20-40 H.P. Gas Tractor, with following specifications:
Tractor must be equipped with four cylinder, horizontal motor, flat spoke drive wheel, and equipped to burn gasoline, kerosene and distillate oil.
OR
One 20-40 H.P. Gas Tractor, with following specifications:
Tractor must be equipped with two cylinder, vertical motor; cylinder to be 8¾ in. in diameter and 9 in. stroke; equipped to burn gasoline, kerosene and distillate oil.
One Five-hundred gallon gasoline steel tank with truck.
Tractors which do not differ radically from the specifications given above will also be considered; give full description of what you propose to furnish, with cuts.
Bidders to plainly mark their envelopes containing their bid:
Hour, date and place of opening.
Character of supplies to be furnished.
Name of Indian Agency requiring the supplies.
Any supplies awarded under this bid will be delivered within .... days from receipt of order.
Please show your delivery point plainly.
Make price f.o.b. Garrison, N. Dak.....
f.o.b. your plant .....
or other points which you may name.
NO PERSON WILL BE RECEIVED AS A CONTRACTOR who is not a manufacturer of, or regular dealer in, the articles which he offers to supply on the attached advertisement and he must expressly warrant that he has employed no third person to solicit or obtain this contract in his behalf, or to cause or procure the same to be obtained upon compensation in any way contingent, in whole or in part, upon such procurement; and that he has not paid, or promised or agreed to pay, to any third person, in consideration of such procurement, or in compensation for services in connection therewith, any brokerage, commission, or percentage upon the amount receivable by him hereunder; and that he has not, in estimating the contract price demanded by him, included any sum by reason of any such brokerage, commission, or percentage; and that all moneys payable to him hereunder are free from obligation to any other person for services rendered, or supposed to have been rendered, in the procurement of this contract. He must further agree that any breach of this warrant shall constitute adequate cause for the annulment of this contract by the United States, and that the United States may retain to its own use from any sums due or to become due thereunder, an amount equal to any brokerage, commission, or percentage, so paid, or agreed to be paid.

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Engineers Corps Contracts

WASHINGTON, Oct. 10—Following is a list of contracts placed by the General Engineer Depot of the Army:

Detroit Twist Drill Co., Detroit, ratchet drills.
Commerce Motor Car Co., Detroit; Dodge Bros., Detroit.
White Co., Cleveland; Dunbar Mfg. Co., Chicago; American Car & Foundry Co., Berwick, Pa.; C. R. Wilson Body Co., Detroit, and Grant Motor Car Corp., Cleveland, handbooks.
Nash Motors Co., Kenosha, steering wheels.
Keystone Vehicle Co., Reading, truck tops.
Locomobile Co. of America, Bridgeport, labor on assembled machines.
Hale & Kilburn Corp., Philadelphia, body drawings.
Holt Mfg. Co., Peoria; Ford Motor Co., Detroit, tractors.
Republic Stamp & Enamel Co., Canton, Ohio, cups.
Nash Motors Co., Kenosha, nut cutters and steering knuckles.
Four Wheel Drive Auto Co., Clintonville, chassis winch prints, radiator gaskets.
Atwater Kent Mfg. Co., Philadelphia, machine-gun sight tracings.
Edward G. Budd Mfg. Co., Philadelphia, steel loops and tabs.
International Harvester Co. of New Jersey, Chicago, machine-gun wagons.

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Supplies and Accounts Contracts

WASHINGTON, Oct. 11—The following list of contracts has been placed by the Bureau of Supplies and Accounts of the Navy Department:

B. F. Goodrich Rubber Co., Akron, insulated copper wire.
Ingersoll-Rand Co., New York, air compressors.
J. T. Wing & Co., Detroit, gaskets.
Fitzgerald Mfg. Co., Torrington, gaskets.
Anderson Engine Co., Chicago, generator sets.
U. S. Light & Heat Corp., Niagara Falls, storage batteries.
Willard Storage Battery Co., Cleveland, storage batteries.
Curtiss Aeroplane & Motor Corp., Buffalo, steel pins.
Aeromarine Plant Motor Co., Keyport, floats.
Empire Rubber & Tire Co., Trenton, hose, cotton, rubber.

—

Quartermaster Contracts Let

WASHINGTON, Oct. 14—Following is a list of contracts placed by the Quartermaster Department, Board of Review:

Harley-Davidson Motor Co., Milwaukee, motorcycle parts, $6,425.99.
Craycroft Oil Co., New York, gasoline, $7,050.
Standard Oil Co. of Kentucky, Louisville, airplane gasoline, $8,100.
Standard Oil Co. of New Jersey, New York, gasoline and kerosene, $9,285.
Columbus Forge & Iron Co., Columbus, vises, $12,806.79.
The Columbian Hardware Co., Cleveland, vises, $47,292.60.
Dover Stamping & Mfg. Co., Cambridge, funnels, $698.74.
Standard Oil Co. of New York, Blissville, L. I., airplane gasoline, $17,100.
Standard Oil Co. of New York, New York, Motor gasoline, $9,800.

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Timken Axle Making Additions

DETROIT, Oct. 14—The Timken-Detroit Axle Co. is erecting a two-story addition to its factory, also a one-story addition to its foundry.

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Bohn Foundry Expands

DETROIT, Oct. 14—Charles B. Bohn Foundry Co. is building a two-story addition to its foundry on Hart Avenue, also a one-story core room at the plant.

Calendar

ENGINEERING

Nov. 14-15 New York. Society of Naval Architects and Marine Engineers. Twenty-sixth general meeting. Engineering Societies Bldg., 29 West 39th Street.

SHOWS

Oct. 12-19 — Atlanta. Tractor demonstrations Eastern State Fair and Automotive Exhibition.
Oct. 14-27—Dallas, Tex., Seventh Annual Texas Automobile Show. Texas State Fair.
Oct. 16-18—Ottawa, Ont., International Plowing Match, Tractor and Farm Machinery Demonstration. Experimental Farm.
Oct. 30-Nov. 4—Shreveport, La. Tractor demonstration. State Fair.
Nov. 11-16—Phoenix, Ariz. Tractor demonstration, State Fair.